7776

A NEW

Compendium of Arithmetic:

CONTAINING

A COPIOUS AND COMPLETE COLLECTION OF QUESTIONS

FOR

SCHOOLMASTERS and Private TUTORS:

AND

PECULIARLY ADAPTED FOR THE INSTRUCTION OF
YOUTH IN EVERY BRANCH OF ARITHMETIC NECESSARY FOR CONDUCTING BOTH FOREIGN
AND DOMESTIC COMMERCE.

By SAMUEL BULLEN.

LONDON:
PRINTED FOR THE AUTHOR, AND SOLD AT NO. 13,
HENRIETTA-STREET, MANCHESTER-SQUARE.

MDCCLXXXIX.

22

MVSEVM
BRITAN
NICVM

THE

PREFACE.

THOUGH I began this work with no other deſign, but for the uſe of my own ſcholars, and in order to eaſe myſelf of a neceſſity I laboured under of ſetting them more ſums or examples than are to be met with in any other book of the kind, which, from their poverty in this reſpect, are very inſufficient to ground youth in a perfect knowledge of this ſcience: yet, as this differs in ſome particulars from other treatiſes of like nature; and as, from the reſolution I have now taken of making it public, it may fall into different hands hereafter, I think it neceſſary to ſay ſomething concerning the order and method I have uſed. I found by experience, that if youth are not well grounded in the firſt principles of Arithmetic, it is with great difficulty and tedious application they arrive at a perfect knowledge of it otherwiſe. I have endeavoured to do them this juſtice, by giving them as many ſums and queſtions in each rule, as I found by the courſe of teaching to be ſufficient, for even thoſe who are not of the readieſt conception.

I have ſeparated what is generally called Reduction Deſcending and Reduction Aſcending, from the reſt of that rule; the former I have placed after Multiplication, and called it the Uſe of Multiplication; and the latter I have placed after Diviſion, and called it the Uſe of Diviſion.—This I am convinced will be found of utility to the learner, as the application of them will become more familiar to his underſtanding, and much lighter to his memory, and likewiſe the remaining part of that rule will be retained and comprehended with more eaſe, than if all were connected together.

For my own convenience, and that of any other perſon who may teach by this book, I have annexed to it a Key, containing the total or whole amount of all the ſums in the different denominations of Addition, Subtraction, Multiplication, Diviſion, &c. This will enable the teacher, with eaſe and expedition, to diſcover whether the learner's work be exactly right or no, and will ſave much trouble.

I have divided all the rules in this volume into ſections; the firſt example in each ſection is worked, the operation of which will be found an eaſier and plainer guide to the learner, than all the knowledge he could gain by written inſtructions, as what is contained in each ſection is much of the ſame tendency, but with an agreeable variety.

In the Rule of Three Direct, I have given 208 queſtions, with their anſwers. It may perhaps be objected, that this number greatly exceeds that uſually given, as few other arithmetical books contain in this rule more than 60, or at moſt 70 queſtions. To this objection I anſwer, that this is a fundamental rule, with which youth ſhould be perfectly well acquainted, before they proceed farther; and I am perſuaded that every one in the practice of teaching will agree with me, that very few boys, after working 50 or 60 queſtions in this rule, will be found capable of ſtating one in it, that admits of any variety or difficulty. Therefore, as exerciſe and example more powerfully operate on the underſtanding of young people, than precept or reaſoning, ſo the number I have given in this rule will not be found uſeleſs.

Fractions I have placed after the Rule of Three Direct, as the underſtanding and operation of them is neceſſary, in order to work and anſwer all the queſtions in Practice, and moſt of the following rules. This I did in order to ſhew the learner their uſe. And their immediate application, and conſtant operation in the courſe of the ſucceeding work, will ſo ſtrongly fix on the memory their utility, as ſcarcely to be forgot, which otherwiſe is ſeldom the caſe.

As the permitting the learner to diſcover the anſwers to the ſums without the previous labour of working them would be highly improper, and may at firſt ſight appear to be an objection to their inſertion, I ſhall take the liberty to point out the method I follow myſelf, in order to obviate this inconvenience, and prevent any ill conſequences that may attend it; which is, to cut out of the books put into the hands of the ſcholars, the pages wherein thoſe anſwers are contained, and retain in my own, and that of my aſſiſtant, books that are entire, which enables us by immediate inſpection to know whether their work is right or wrong, and puts it out of their power to procure their anſwers without the true and regular operation of their work.

As to the ſucceeding part of the work, I think it needleſs for me to proceed in deſcribing it more particularly, but I think I may venture to ſay, that it will not be found without order and merit, and ſo well agreeing with the title I have given it, as to be found a uſeful and inſtructive exerciſe for the young merchant and tradeſman, leading them with pleaſure, becauſe with eaſe, into the knowledge of every branch of Arithmetic neceſſary for conducting both foreign and domeſtic commerce.

Though my firſt view in compiling the following pages was only to alleviate my own labour, and facilitate the knowledge of thoſe entruſted to my care, and my primary intention in committing them to print was merely to avoid the tedioufneſs and drudgery of renewing and multiplying copies: yet having, not without diffidence, determined on making them public, I will not diſſemble my ſolicitude concerning their reception. They have with me been the ſtandard of thirty years ſucceſsful practice; and my higheſt ambition will be attained if they are found equally ſerviceable to others.

Note. The different totals or anſwers to all the ſums, &c. beginning with No. 1 in Addition, and ending with No. 60 in Reduction, are to be met with in the Key at the end of the volume.

No. 13, *Henrietta Street*,
Mancheſter-Square.

S. B.

CON-

CONTENTS.

Page.

NOTATION and Numeration 1
Queſtions to exerciſe Numeration ib.
Addition 3
Subtraction and Queſtions to exerciſe it 21
Multiplication 31
The Uſe of Multiplication 34
Compound Multiplication 40
Diviſion 44
The Uſe of Diviſion 46
Compound Diviſion 53
Reduction 55
Bills ſuitable to different Trades, &c. 62
The Rule of Three Direct 66
Notation and Numeration of Fractions 92
Abbreviation of Fractions ib.
Addition of Fractions 94
Multiplication of Fractions 97
Subtraction of Fractions 103
Diviſion of Fractions 106
Queſtions to exerciſe Fractions 110
The Rule of Three Direct in Fractions 112
Practice 120
Tare and Tret 128
Exchange 133
The Double Rule of Three Direct 155
The Rule of Three Inverſe 159
The Double Rule of Three Compound 161
Simple Intereſt 163
Compound Intereſt 171
Barter 176

Fellowſhip

Page.

Fellowſhip — 183
Fellowſhip with Time — 185
Loſs and Gain — 187
Equation of Payments — 195
Rebate, or Diſcount — 197
Alligation Medial — 200
Alligation Alternate — 202
Arithmetical Progreſſion — 212
Geometrical Progreſſion — 214
Permutation — 217
Extraction of the Square Root — 218
Extraction of the Cube Root — 219
The Uſe of the Cube Root — 221
Single Falſe Poſition — 222
Double Falſe Poſition — 225
Croſs Multiplication and its Uſe — 234
Queſtions for Exercise — 239

THE

KEY.

The Totals or Anſwers to all the Sums in Addition of whole Numbers, &c. &c.

No.			No.		
No. 1	is	16537893	No. 8	is	6251729526
2		20948322	9		7100092270
3		28756109	10		6558740721
4		357888536l	11		762781476061l
5		4002416320	12		66545798756200
6		5153390382	13		75303272960064
7		6408957918	14		65058359929l2

Addition of Money.

No.		l.	s.	d.	No.		l.	s.	d.
No. 1	is	1761	18	11	No. 10	is	5172	4	1
2		2612	19	3	11		5869	12	10
3		2638	11	10	12		6030	17	6
4		3076	12	4	13		6132	16	0½
5		4203	0	8	14		3971	5	6½
6		3806	13	8	15		45977	9	3¼
7		4588	2	5	16		30567	19	11½
8		3994	10	10	17		44899	5	9
9		5441	0	10	18		46440	9	1½

Addition of Troy Weight.

		lb.	*oz.*	*dwt*	*gr.*			*lb.*	*oz*	*dwt*	*gr.*
No. 1	is	420	6	5	11	No. 6	is	632	1	1	10
2		440	2	1	12	7		4304	11	19	21
3		653	10	7	21	8		4229	8	17	4
4		597	11	13	4	9		3154	5	18	20
5		611	5	0	7	10		4783	2	14	19

Addition of Avoirdupois Weight.

		tuns	*cwt.*	*qr.*	*lb.*	*oz.*			*tuns*	*cwt.*	*qr.*	*lb.*	*oz.*
No. 1	is	502	4	3	15	6	No. 6	is	539	10	2	18	4
2		521	4	0	17	4	7		657	2	3	9	15
3		493	8	3	18	7	8		630	11	3	18	15
4		483	18	0	25	4	9		3760	18	2	8	5
5		512	9	3	26	7	10		4366	2	0	13	14

Addition of Apothecaries Weight.

		lb.	*oz*	*dr*	*ſcr*	*gr*			*lb.*	*oz*	*dr*	*ſcr*	*gr*
No. 1	is	551	6	5	2	11	No. 5	is	660	5	1	1	12
2		520	8	1	1	8	6		766	3	0	0	17
3		672	2	3	1	12	7		942	6	5	2	5
4		682	5	1	2	8	8		980	7	6	2	2

Addition of Dry Meaſure.

		loads	*qrs.*	*bus.*	*pk.*			*loads*	*buſh.*	*pk*	*pi.*
No. 1	is	3922	4	6	2	No. 3	is	3881	7	1	13
2		4125	1	4	3	4		3682	8	2	4

Addition of Liquid Meaſure.

		tuns	*pipe*	*hhd*	*gal.*	*pi.*			*tuns*	*hhds*	*gal.*	*pi.*
No. 1	is	4945	1	1	15	1	No. 3	is	4955	3	8	7
2		5229	1	1	22	2	4		5582	0	16	1

Wincheſter

Winchester Meaſure.

		butts	*hhds.*	*b.*	*k.*	*f.*	*g.*			*butts*	*bar.*	*gal.*	*qts.*
No. 1	is	537	0	1	1	1	5	No. 2	is	5842	2	30	0

Cloth Meaſure.

No. 1	is	4660	1	2	No. 3	is	6306	4	3
2		4829	0	1	4		3979	5	3

Land Meaſure.

		acr.	*rood*	*rod*	*½yd*			*acr.*	*rood*	*rod*	*½yd*
No. 1	is	5927	1	33	3	No. 2	is	6814	3	31	3

Long Meaſure.

		deg.	*lea.*	*m.*	*f.*	*rod*			*rods*	*yds.*	*ft.*	*in.*
No. 1	is	447	13	1	3	9	No. 3	is	3815	2½	1	6
2		5300	17	0	5	28	4		5899	1	0	7

Addition of Time.

		yrs.	*m.*	*w.*	*d.*	*h.*	*m.*	*ſec.*
No. 1	is	4218	1	1	5	1	22	59
2		4016	1	1	4	0	6	9

SUBTRACTION.

Anſwers to all the ſums in Subtraction, that admit of delay in the diſcovering thereof; viz. ſuch as conſiſt of Addition and Subtraction.

Subtraction of Money.

		l.	s.	d.			l.	s.	d.
No. 1 is	Total	163	19	$9\frac{3}{4}$	No. 5 is	Total	475	10	$2\frac{1}{2}$
	Rem.	637	10	$4\frac{3}{4}$		Rem.	534	10	$9\frac{1}{2}$
2	T.	199	5	$1\frac{3}{4}$	6	T.	578	0	$4\frac{3}{4}$
	R.	701	19	$10\frac{3}{4}$		R.	321	19	$7\frac{1}{2}$
3	T.	194	8	$9\frac{1}{2}$	7	T.	545	5	$7\frac{3}{4}$
	R.	598	3	0		R.	255	4	$6\frac{3}{4}$
4	T.	365	0	$2\frac{1}{2}$	8	T.	524	5	$0\frac{1}{4}$
	R.	434	19	$9\frac{3}{4}$		R.	377	6	$9\frac{1}{4}$

Of Troy Weight.

		lb.	oz	dwts	gr			lb.	oz	dwts	gr
No. 1 is	T.	980	9	17	0	No. 4 is	T.	1614	3	8	7
	R.	6179	3	6	0		R.	5386	8	12	17
2	T.	1653	0	1	0	5	T.	1071	6	13	12
	R.	7357	1	19	1		R.	7039	4	6	12
3	T.	2200	5	5	1	6	T.	2028	4	4	19
	R.	6819	7	15	2		R.	6971	7	15	5

Of Avoirdupois Weight.

		tuns	cwt	qr	lb	oz			tuns	cwt	qr	lb	oz
No. 1 is	T.	177	17	1	8	12	No. 2 is	T.	216	19	2	6	6
	R.	329	6	0	0	8		R.	493	1	1	23	10

Of Apothecaries Weight.

		lb.	oz	dr	ſcr	gr			lb.	oz	dr	ſcr	gr
No. 1 is	T.	360	6	4	2	14	No. 2 is	T.	431	8	6	0	6
	R.	340	6	3	1	6		R.	468	3	2	2	14

Of

Of Dry Measure.

		loads	qrs.	b.	p.			loads	b.	pk.	pi.
No. 1 is	T.	582	3	7	0	No. 2 is	T.	454	5	3	13
	R.	118	2	4	0		R.	447	11	0	3

Of Liquid Measure.

		tuns	pipes	hhd	g.			hhds.	gal.	pi.
No. 1 is	T.	126	0	0	16	No. 2 is	T.	350	60	5
	R.	64	0	0	47		R.	550	4	3

Of Winchester Measure.

		butt	hd.	½b.	k.	f.	g			hhd.	½bar.	g.
No. 1 is	T.	84	0	0	1	0	2	No. 2 is	T.	192	2	1
	R.	7	0	2	1	1	8		R.	708	2	35

Of Cloth Measure.

No. 1 is	T.	119	2	3	No. 3 is	T.	58	1	3
	R.	581	2	3		R.	13	1	1
2	T.	52	1	2					
	R.	27	2	2					

Answers to the Sums in Multiplication.

Mul.	Prod.	Mul.	Prod.
24	1791257472	324	1903455851 76
35	2043135290	425	318171776875
46	1816206638	579	285943439811
67	43455845503	879	769043700411
78	37399915410	987	784536269538
89	75467893273	594	562570241706

Mul.

Mul.	Prod.	Mul.	Prod.
5174	904775170702	490870	336111004928830
9408	90078596496000	950708	894483849516664
8709	72976941483884	860970	739637019267300

Mult.	Prod.	Mult.	Prod.
79800	3910886280000	807600	765611186500800
869000	69588654476000	9087000	645912501780000

Mult.	Prod.
700859000	278577883869760000
975008000	729315314826560000
1700873000	1647123851687300000

Anſwers to the Sums in Diviſion.

Div.	Quot.	Div.	Quot.
13	23214	87	4974867
14	4794867	96	6482752
15	6485947	98	6485749
17	5846749	124	574551+44
19	3572849	235	346254
24	2846275	257	252422+130
35	4826724+33	279	332073+271
46	6485749	436	131840+402
75	987465	625	119401+133
84	6284752		

584	146001+155	1352	349618+1188
628	42766+346	1768	355513+452
752	23386+675	2847	133293+1213
798	78768+632	2758	269711+1999
859	110321+103	5287	54184+5066
978	40642+761	6579	72906+962

Div.

Div.	Quot.	Div.	Quot.
7294	102645+2095	572800	1306969+ 241500
6849	142336+6578	758600	1285074+ 124009
7968	93669+4881	947800	302174+ 207409
8075	47998+2537	879400	651353+ 539842
9476	30154+6981	4972000	190797+4600973
9786	77629+7333	9075000	83689+8797864

The ſix laſt Sums in Reduction, their Articles and Product.

No. 55.

Articles.		s.	d.	Product. l.	s.	d.
872	at	5	3	228	18	0
924		4	6	207	18	0
748		9	0	336	12	0

No. 56.

		s.	d.	l.	s.	d.
5041	at	13	6	3402	13	6
852		10	6	447	6	0
7480		2	6	935	0	0
691		18	0	621	18	0

No. 57.

		s.	d.	l.	s.	d.
101	at	13	6	68	3	6
74½		18	0	67	1	0
200½		5	3	52	12	7½
84¼		27	0	113	14	9
107		6	9	36	2	3

No. 58.

		s.	d.	l.	s.	d.
251	at	10	6	131	15	6
501		5	3	131	10	3
203		2	8½	27	9	9½
79		11	4½	44	18	7½
20½		72	0	73	16	0
172		2	6	21	10	0
36½		18	0	32	17	0

No. 59.

		s.	d.	l.	s.	d.
1201½	at	0	12	60	1	6
705⅓		2	6	88	3	4
1002		3	4	167	0	0
539		5	0	134	15	0
971½		21	0	1020	1	6
2042⅓		18	0	1838	2	0
374½		6	9	126	7	10½
1400⅓		27	0	1890	9	0
101½		10	6	53	5	9
743		5	3	195	0	9

No. 60.

		s.	d.	l.	s.	d.
2071	at	2	8½	280	8	11½
962		11	4½	547	2	9
1036½		9	0	466	8	6
7452		5	3	1956	3	0
3674½		13	4	2449	13	4
372		5	0	218	0	0
3080½		2	6	385	1	3
947		10	6	497	3	6
4020½		36	0	7236	18	0
684		18	0	615	12	0
9999		0	6	249	19	6
8054		0	3	100	13	6
7464		1	0	373	4	0
1072½		5	5	290	9	4½
647⅓		21	0	679	14	0
872½		4	6	196	6	3

THE
Young Merchant and Tradeſman's
ARITHMETIC.

CHAP. I.

OF NOTATION AND NUMERATION OF WHOLE NUMBERS.

SECT. I.

NOTATION AND NUMERATION teach how to write and value any number compoſed of the following characters, viz.

One, two, three, four, five, ſix, ſeven, eight, nine, cypher.
1, 2, 3, 4, 5, 6, 7, 8, 9, 0.

NUMERATION TABLE.

1	Units	1
12	Tens	10
123	Hundreds	100
1,234	Thouſands	1000
12,345	Ten thouſands	10000
123,456	Hundred thouſands	100000
1,234,567	A million	1000000
12,345,678	Ten millions	10000000
123,456,789	Hundred millions	100000000

II.

QUESTIONS TO EXERCISE NUMERATION.

How do you ſet down the following numbers, viz.
One hundred and ſixty two. Anſ. 162.
One hundred and four.
Two hundred and forty three.
Seven hundred and nine.

III.

Of Numbers conſiſting of four figures.

Set down

Seven thouſand nine hundred and forty-two. 7942.
Three thouſand five hundred and ſixty-one.
Eight thouſand ſeven hundred and ſeven.
Two thouſand five hundred and twenty-three.

IV.

Of numbers conſiſting of five figures.

Put down, viz.

Thirty thouſand ſix hundred and forty-one. 30641.
Fifty-two thouſand and ſeventy-nine.
Eighty-four thouſand three hundred.
Seventy thouſand and fifty-eight.

V.

Of numbers conſiſting of ſix figures.

Write down, viz.

Two hundred and thirty-four thouſand, ſeven hundred and eighty-nine. 234,789.

Five hundred and thirty-nine thouſand, ſix hundred and forty-ſeven.

Three hundred and ſeventy-two thouſand three hundred.

Four hundred and twenty-eight thouſand.

VI.

Of numbers conſiſting of ſeven figures.

Set down, viz.

Two millions, five hundred and forty-ſeven thouſand, three hundred and four. 2,547,304.

Five millions, ſixty-one thouſand, nine hundred and eight.

Eight millions, two thouſand and one.

Four millions, ſixty thouſand, three hundred and ſeventy.

Seven millions, five hundred and thirty thouſand and ninety-one.

VII.

Of numbers conſiſting of eight figures.

Put down the following ſums, viz.

Ten millions, three hundred and ninety-ſeven thouſand, four hundred and fifty-ſeven. 10,397,457.

Sixty-nine millions, five hundred and ſeven thouſand, eight hundred and forty-two.

Eighty millions, two hundred thouſand, five hundred and thirty-ſeven.

Seventy-three millions, two hundred and four thouſand and five.

Set down

One hundred and forty-eight millions, three hundred fifty-nine thouſand, ſix hundred and twelve.

CHAP. II.

ADDITION

Teacheth to add two or more ſums together, to make one total.

Sect. I.

Add the following ſums, viz.

(No. 1.)	(2.)	(3.)
3524162	4352164	6437357
5243614	2615743	3754679
1425326	6242476	5261743
2131526	3524365	8327456
4213265	4213574	4974874

(4.)	(5.)	(6.)
537625471	957463794	497286461
375483624	589076347	859657936
643748643	257984736	526483743
265354876	325427564	794825467
947281647	849762839	375638794
372538624	374158246	948275824
436852476	648542794	682947328
		468274829

(7.)
874678427
285943695
658417465
827163698
472589746
746273574
374648465
847296842
742639574
579306432

(8.)
879647464
542698574
685455841
754528276
126354728
241276472
769743746
935238467
673528472
643257486

(9.)
965786974
438566249
574654586
647585472
752133625
847352427
962517964
421625392
643296735
846572846

(10.)
723849526
431245839
976475623
457896841
864539425
592135467
726983276
642743598
495617432
647253694

(11.)
865497569842
578935834695
957654575687
475347465859
648572571365
854217483597
786796291584
624652162476
857494329657
978646475849

(12.)
795865649875
427358759364
756487565987
687695743469
843598457684
475958905763
847587529849
321453948729
958976829473
539596485427

(13.)

824965749685
956384935785
687575675439
589645437574
486752563175
975834172458
845912967786
746261652426
567239494857
849754646879

(14.)

759864565897
364597853427
879565784563
649347569786
846784534859
367905859475
849295837478
729849354321
473928697859
584695935247

PENCE TABLE.

d.		s.	d.
12	is	1	
20	—	1	8
24	—	2	
30	—	2	6
36	—	3	
40	—	3	4
48	—	4	
50	—	4	2
60	—	5	
70	—	5	10
72	—	6	
80	—	6	8
84	—	7	
90	—	7	6
96	—	8	
100	—	8	4
108	—	9	
110	—	9	2
120	—	10	
130	—	10	10
132	—	11	
140	—	11	8
144	—	12	

POUNDS TABLE.

s.		l.	s.
20	—	1	
30	—	1	10
40	—	2	
50	—	2	10
60	—	3	
70	—	3	10
80	—	4	
90	—	4	10
100	—	5	
110	—	5	10
120	—	6	
130	—	6	10
140	—	7	
150	—	7	10
160	—	8	
170	—	8	10
180	—	9	
190	—	9	10
200	—	10	

II.

ADDITION OF MONEY.

Note, 4 Farthings make 1 Penny, 12 Pence 1 Shilling, and 20 Shillings 1 Pound.

(No. 1.)

l.	*s.*	*d.*
472	7	4
246	5	3
684	2	1
359	4	3

(2.)

l.	*s.*	*d.*
758	4	3
524	6	5
847	3	1
483	5	6

(3.)

974	8	7
358	6	4
826	9	8
479	7	3

(4.)

594	7	8
947	9	5
685	6	9
849	8	6

(5.)

748	12	10
584	7	3
957	11	6
396	9	4
643	13	5
872	6	4

(6.)

492	14	7
938	17	11
572	12	6
729	10	10
375	13	8
697	4	2

(7.)

594	15	11
947	13	10
486	10	7
849	16	2
394	8	8
576	11	11
738	5	4

(8.)

857	13	11
495	16	10
548	12	7
937	17	11
685	13	9
468	15	10

(9.)

l.	s.	d.
974	16	10
586	12	8
948	14	11
635	17	7
479	14	10
857	18	6
372	13	11
584	11	7

(10.)

l.	s.	d.
694	18	10
479	12	5
846	17	11
397	15	7
920	12	10
694	14	11
279	17	8
857	13	11

(11.)

857	19	10½
574	12	11¾
946	16	8
493	11	5¼
728	15	11
385	13	9½
648	10	7
275	14	10¾
957	16	8¼

(12.)

486	12	11¾
859	15	10½
572	19	11
948	18	8¾
685	16	10¼
379	11	7½
753	17	10
594	12	8¾
748	10	11½

(13.)

948	13	10¼
574	7	8½
796	18	11¾
859	9	7½
498	16	10¼
537	4	9
728	19	11¾
807	7	4½
380	16	11

(14.)

472	11	7½
906	4	2¾
570	12	8½
729	16	10
390	9	6¼
583	13	2¼
94	18	6½
48	7	11¾
174	10	10½

(15.)

l.	*s.*	*d.*
4739	18	11¾
8496	14	8½
7948	19	10¾
5874	15	9½
3758	13	11½
874	16	8½
57	19	10¾
9	15	11½
46	18	7¾
738	13	10½
5946	16	8¾
7483	4	1¾

(16.)

l.	*s.*	*d.*
7584	14	7¼
3862	19	8½
5748	17	11¼
7285	19	10¾
493	12	11½
48	15	9¾
7	13	11½
49	18	8¾
4	17	10½
39	11	11¾
857	16	7½
4582	19	10½

(17.)

5748	19	10½
8493	15	11¾
764	12	7½
98	16	10¾
7	8	4¼
4865	18	11½
8279	14	10¼
953	7	6½
3574	16	11¾
7382	19	10¾
4728	13	9½

(18.)

8492	17	10½
3857	12	10¾
74	18	7¼
947	15	11½
5768	13	8
8573	9	10¾
4728	17	9½
9385	12	10¾
3758	16	11¼
842	10	7¾
9	1	11½

III.

ADDITION OF TROY-WEIGHT.

N. B. By this rule are weighed gold, ſilver, jewels, electuaries, and liquors in general.

Note, 24 Grains make 1 Penny-weight, 20 Penny-weights 1 Ounce, and 12 Ounces 1 Pound.

(No. 1.)

lb.	*oz.*	*dwts.*	*gr.*
74	11	14	18
58	7	17	21
27	10	13	17
84	8	16	22
47	4	12	14
79	11	13	18
46	10	15	21

(2.)

lb.	*oz.*	*dwts.*	*gr.*
84	10	18	23
47	9	14	18
64	11	15	21
39	7	19	17
58	11	14	19
68	9	17	22
74	11	19	12

(3.)

97	11	17	21
58	10	14	18
72	8	16	21
57	11	13	19
84	9	15	21
69	10	16	23
57	8	13	22
94	11	19	21
58	9	17	23

(4.)

58	10	14	23
79	11	18	20
46	9	13	18
74	11	19	12
58	7	17	19
39	10	15	21
84	11	18	14
68	9	14	22
84	10	18	23

(5.)

38	11	17	23
87	9	13	21
58	7	15	18
74	10	13	20
59	8	12	19
86	11	16	22
47	6	18	14
81	9	11	21
74	11	18	17

(6.)

72	10	14	22
59	7	19	18
38	11	15	21
46	8	13	17
94	9	18	23
57	10	17	19
86	4	10	15
79	11	16	20
94	8	12	23

(7.)

lb.	*oz.*	*dwts.*	*gr.*
574	11	15	21
758	10	18	22
974	8	13	20
497	11	17	23
285	9	14	18
638	10	19	21
472	11	12	17
59	7	16	19
7	4	14	12
4	10	18	23
28	8	15	17

(8.)

lb.	*oz.*	*dwts.*	*gr.*
496	10	12	22
748	7	19	14
857	11	16	19
574	8	13	23
68	10	18	20
9	11	12	17
5	9	17	21
47	10	11	23
583	11	16	21
360	10	19	18
473	11	15	22

(9.)

946	10	12	23
483	8	19	20
75	11	16	22
9	10	18	20
4	7	13	18
82	11	17	16
475	10	12	21
37	11	18	15
4	9	15	23
48	10	16	19
253	11	19	21
728	8	14	18

(10.)

758	11	16	21
274	8	19	23
527	10	14	18
385	7	17	20
742	11	13	19
479	9	15	22
80	10	18	20
5	8	14	23
7	11	19	21
583	10	7	8
647	7	15	23
286	11	18	17

IV.

ADDITION OF AVOIRDUPOIS WEIGHT.

N.B. By Avoirdupois Weight are commonly weighed butter, cheeſe, ſoap, candles, braſs, copper, iron, and all ſorts of grocery wares from whence may iſſue a waſte.

Note, 16 Drams make one Ounce, 16 Ounces 1 Pound, 28 Pounds one Quarter of a Hundred, 4 Quarters 1 Hundred, 20 Hundreds 1 Tun.

(No. 1.)

tuns	*cwt.*	*qrs.*	*lb.*	*oz.*
47	12	3	21	11
84	14	2	24	13
59	10	1	18	10
75	16	0	7	12
92	11	3	25	14
37	9	2	15	7
46	18	0	23	11
57	10	3	17	8

(2.)

tuns	*cwt.*	*qrs.*	*lb.*	*oz.*
72	14	2	24	12
59	17	3	18	14
47	12	1	20	11
84	16	2	22	10
41	8	3	17	13
75	5	1	23	7
43	15	0	8	11
85	12	3	20	6

(3.)

74	15	2	25	14
35	12	3	17	10
57	10	1	21	12
94	17	2	23	11
60	12	0	20	13
73	10	3	9	7
38	16	1	21	11
57	12	2	17	9

(4.)

54	13	3	23	12
76	18	1	21	14
43	10	2	14	10
85	14	3	26	12
37	17	0	20	15
64	15	3	24	10
92	12	1	25	8
27	14	2	7	3

(5.)

58	17	2	26	14
74	13	3	22	10
39	18	1	27	15
68	15	3	24	12
25	19	2	18	10
79	14	3	24	11
42	19	1	21	15
85	17	2	7	4
35	12	0	19	12

(6.)

74	15	2	21	13
48	12	3	27	15
85	19	2	20	12
37	14	1	24	10
94	17	3	26	14
27	19	2	21	11
58	13	1	25	15
35	16	3	23	12
74	19	2	20	14

(7.)

(7.)

tuns	cwt.	qrs.	lb.	oz.
94	16	2	27	12
57	13	3	21	10
84	18	1	24	15
37	19	3	26	13
72	13	2	23	10
54	15	2	18	15
97	12	3	15	11
49	14	1	26	14
68	19	3	24	15
37	16	3	22	12

(8.)

tuns	cwt.	qrs.	lb.	oz.
47	14	3	25	10
64	18	1	23	14
39	17	2	27	12
57	13	3	22	15
85	18	2	24	11
64	15	3	26	14
97	19	3	20	12
72	16	2	18	15
38	18	1	27	11
59	16	3	23	13

(9.)

472	17	3	24	14
947	12	2	22	11
852	19	3	27	13
96	15	1	21	15
8	12	3	25	12
	19	2	21	10
75	14	3	24	13
849	16	2	20	12
387	13	3	18	8
59	18	1	23	14
7	15	2	27	11

(10.)

758	14	2	25	12
472	17	3	24	14
843	19	1	26	11
594	16	3	21	15
472	18	2	27	13
58	13	1	25	10
4	19	3	27	15
27	15	2	20	12
475	12	3	18	14
649	18	1	23	11
5	13	2	21	15

V.

ADDITION OF APOTHECARIES WEIGHT.

N. B. Apothecaries mix and compound their medicines by this rule, yet they buy and ſell their commodities by Avoirdupois Weight.

Note, 20 Grains make 1 Scruple, 3 Scruples 1 Dram, 8 Drams 1 Ounce, and 12 Ounces 1 Pound.

(No. 1.)

lb.	*oz.*	*dr.*	*ſcr.*	*gr.*
47	11	5	2	17
85	9	7	1	14
97	10	4	2	18
53	7	6	1	15
96	11	3	2	17
74	8	6	1	12
94	6	2	0	18

(2.)

lb.	*oz.*	*dr.*	*ſcr.*	*gr.*
58	10	7	2	19
87	5	4	1	15
96	10	6	0	19
49	8	4	2	12
74	11	7	1	17
58	10	4	2	11
93	9	5	0	15

(3.)

76	11	7	2	12
48	7	5	0	14
64	10	3	1	17
87	6	7	2	15
57	10	4	1	11
84	7	6	2	19
68	11	7	1	15
37	10	5	2	18
79	11	2	0	12
64	8	7	1	19

(4.)

74	11	4	2	17
58	7	6	1	18
74	11	5	2	19
58	10	7	1	14
87	7	4	2	18
74	11	6	1	14
39	8	3	2	17
56	11	5	0	15
87	8	7	2	7
67	10	4	0	9

(5.)

76	10	4	2	13
57	11	6	1	19
38	7	3	2	14
79	11	5	1	18
54	9	7	2	17
86	10	4	1	15
79	8	7	2	12
86	11	2	1	16
59	7	5	2	13
38	10	7	1	15

(6.)

93	9	6	1	17
94	10	7	1	10
57	11	4	2	15
74	6	5	1	17
97	10	6	2	14
84	9	2	1	17
36	11	0	1	4
79	7	6	2	12
58	11	4	0	17
86	9	2	1	14

(7.)

lb.	*oz.*	*dr.*	*ſcr.*	*gr.*
96	10	6	1	19
47	11	5	2	17
57	10	4	1	13
79	11	5	1	18
74	11	3	2	19
94	10	7	1	10
85	9	6	1	14
49	8	4	2	12
84	7	6	2	19
54	11	7	1	17
58	10	5	1	14
57	11	4	2	15
97	10	6	2	18

(8.)

lb.	*oz.*	*dr.*	*ſcr.*	*gr.*
74	11	7	1	17
68	10	4	2	15
79	8	7	2	12
87	7	4	1	18
74	11	5	1	17
53	7	6	2	15
58	10	4	1	11
37	9	5	2	18
86	10	4	1	15
74	11	6	1	14
97	10	7	2	18
96	8	3	2	17
87	6	7	1	15

VI.

ADDITION OF DRY MEASURE.

N. B. By this rule are meaſured all dry goods, ſuch as coals, ſand, ſalt, oyſters, fruit, wheat, barley, peas, oats and all other grain.

Note, 2 Pints make 1 Quart, 2 Quarts 1 Pottle, 2 Pottles 1 Gallon, 2 Gallons or 16 Pints 1 Peck, 4 Pecks 1 Buſhel, 4 Buſhels 1 Coomb, 2 Coombs or 8 Buſhels 1 Seam or Quarter, and 5 Quarters or 40 Buſhels 1 Load.

(No. 1.)

loads	*qrs*	*buſh.*	*pecks*
572	4	7	3
948	2	5	2
739	3	2	3
57	4	6	1
9	3	4	3
5	2	7	2
58	4	3	1
479	3	6	3
947	1	4	2
94	4	5	3
7	2	7	3

(2.)

loads	*qrs.*	*buſh.*	*pecks*
479	3	5	3
754	2	7	1
976	4	3	3
584	3	6	2
796	2	4	3
84	4	2	1
7	3	5	3
49	4	2	2
385	2	6	3
4	3	7	2

(3.)

loads	buſh.	pecks	pints
748	38	3	14
594	31	2	12
857	36	3	10
948	39	2	15
74	30	3	13
8	34	2	11
5	29	1	15
529	37	3	12
47	25	2	14
4	36	1	10
58	24	3	15

(4.)

loads	buſh.	pecks	pints
947	30	2	10
486	39	3	14
72	34	1	12
8	31	2	15
7	27	3	14
58	32	1	12
586	29	3	15
347	38	2	13
674	36	3	15
489	25	2	12

VII.

ADDITION OF LIQUID MEASURE.

N. B. By this rule are commonly meaſured all ſorts of wine, ſpirituous liquors, cyder, perry, mead, honey, vinegar, oil, ſtrong waters, &c.

Note, 2 Pints make 1 Quart, 4 Quarts or 8 Pints 1 Gallon, 10 Gallons 1 Anker of brandy or rum, 18 Gallons 1 Runlet, 31½ Gallons 1 Barrel of wine or vinegar, 42 Gallons 1 Tierce, 63 Gallons 1 Hogſhead, 2 Hogſheads 1 Butt or Pipe, and 2 Pipes or 4 Hogſheads 1 Tun.

(No. 1.)

tuns	pipe	hhds	gall.	pints
478	1	1	52	5
947	1	1	48	2
594	0	1	56	7
746	1	1	51	4
387	1	1	36	6
528	1	0	47	4
476	1	1	44	7
783	1	1	54	6

(2.)

tuns	pipe	hhds	gall.	pints
579	1	1	57	7
854	1	1	49	4
382	1	1	53	6
57	0	1	47	2
8	1	0	39	5
46	1	1	54	7
483	1	1	27	3
749	1	0	56	4
84	0	1	37	7
347	1	1	54	5
684	1	1	58	2
947	1	1	51	6

(3.)

tuns	*hhds*	*gall.*	*pints*
974	3	47	7
757	2	59	4
539	3	53	6
285	1	48	3
472	3	37	1
857	2	54	5
483	1	27	3
583	2	58	2

(4.)

tuns	*hhds*	*gall.*	*pints*
748	3	48	5
492	1	57	7
635	2	59	4
857	3	57	2
574	2	48	6
95	3	57	4
8	1	42	7
4	2	53	3
57	3	49	6
583	2	58	2
946	3	50	7
574	1	61	4

VIII.

ADDITION OF WINCHESTER MEASURE.

N. B. In all parts of England, except London, 34 Gallons make a Barrel of ale, ſtrong or ſmall beer, but in London, 36 Gallons make a Barrel of beer, and 32 Gallons a Barrel of ale.

Note, 2 Pints make 1 Quart, 4 Quarts 1 Gallon, 9 Gallons 1 Firkin, 2 Firkins 1 Kilderkin, 2 Kilderkins or 36 Gallons 1 Barrel, 1½ Barrel 1 Hogſhead, 2 Hogſheads 1 Butt or Pipe, and 2 Butts 1 Tun.

(No. 1.)

butts	*hhds*	*bar.*	*kil.*	*fir.*	*gall.*
47	1	1	1	1	8
79	1	1	1	1	4
38	1	0	1	0	7
57	1	1	0	1	3
94	0	1	1	1	6
7	1	1	1	1	4
8	1	1	1	1	7
5	1	1	1	1	5
59	1	1	0	1	6
75	1	0	1	0	4
58	1	1	0	1	5

(2.)

butts	*bar.*	*gall.*	*qt.*
947	2	32	3
594	1	35	1
748	1	29	2
57	2	31	3
9	2	34	1
75	1	32	3
758	2	34	2
472	2	27	3
847	1	29	1
749	2	34	3
578	1	31	2

IX

IX.

ADDITION OF CLOTH MEASURE.

N. B. Tapeſtry is meaſured by the ell Flemiſh, hollands by the ell Engliſh, and all ſorts of woollen cloths, wrought ſilks, linen, tape, cord, &c.

Note, 2 Inches and a quarter make 1 Nail, 4 Nails 1 Quarter of a Yard, 4 Quarters 1 Yard, 5 Quarters 1 Ell Engliſh, 3 Quarters 1 Ell Flemiſh, and 6 Quarters 1 French Ell.

(No. 1.)

yds.	*qrs*	*nails*
574	3	2
849	2	1
473	3	2
746	2	1
973	1	3
684	2	3
357	1	2

(2.)

ells Fl.	*qrs*	*nails*
492	2	3
728	1	2
943	2	3
572	1	1
857	2	3
473	2	2
759	1	3

(3.)

ells E.	*qrs*	*nails*
847	4	3
579	2	1
748	3	3
374	4	2
647	2	3
873	1	2
94	4	1
47	3	3
9	2	2
5	3	1
48	2	2
597	4	3
783	1	2
647	2	3

(4.)

Fr. ells	*qrs*	*nails*
596	4	3
74	3	2
49	1	3
374	5	2
748	2	3
7	5	1
9	4	2
45	2	3
8	5	1
496	3	2
47	4	3
94	3	1
946	2	3
478	3	2

X.

ADDITION OF LAND MEASURE.

N. B. The following denominations are thoſe commonly uſed in land meaſure, and give the content of any piece of ground in acres.

Note, $5\frac{1}{2}$ Yards make 1 Rod, Pole or Perch, 40 Rods 1 Furlong in length, 40 Rods in length and 1 in breadth 1 Rood or Quarter of an Acre, and 4 Roods 1 Acre.

Note, Though $16\frac{1}{2}$ feet make a Statute Rod, Pole or Perch, yet in low fenny countries, and barren lands, it is cuſtomary to allow 18 feet, and in meaſuring foreſt lands, 21 feet to the Pole.

(No. 1.)

acres	*roods*	*rods*	$\frac{1}{2}$ *yds*
475	3	37	10
948	2	29	8
794	3	24	10
579	1	31	9
846	3	36	7
493	2	27	10
49	3	30	6
5	2	39	8
6	1	36	9
72	3	34	10
794	2	32	7
857	3	29	8

(2.)

acres	*roods*	*rods*	$\frac{1}{2}$ *yds*
947	2	39	10
574	3	37	7
796	1	32	8
479	3	38	10
84	2	31	9
7	3	29	10
65	1	37	5
849	2	32	9
762	3	39	10
972	2	36	8
697	1	38	6
574	2	34	10

XI.

ADDITION OF LONG MEASURE.

N. B. The following are the denominations uſed in meaſuring the length or diſtance of any place or thing from another, without regard to the breadth.

Note, 3 Barley-corns make 1 Inch, 12 Inches 1 Foot, 3 Feet 1 Yard, $5\frac{1}{2}$ Yards 1 Rod, Pole or Perch, 40 Perches 1 Furlong, 8 Furlongs 1 Mile, 3 Miles 1 League, 20 Leagues 1 Degree, and 360 Degrees the circumference of the earth and ſea.

Note, Though 60 miles are commonly allowed to make a degree, ſtill $69\frac{1}{2}$ (very near) are a degree; 4 Inches make a Hand, and is commonly uſed in meaſuring of horſes; a Fathom is 6 feet, and the uſe of it is to meaſure depths.

(No. 1.)

deg.	leag.	miles	fur.	rods
47	18	2	5	37
94	13	1	7	34
59	15	2	4	31
86	19	1	6	39
49	12	2	3	36
68	17	1	5	34
39	14	2	7	38

(2.)

749	14	2	7	34
974	17	1	4	39
483	15	2	6	32
47	18	1	3	29
5	12	2	5	38
9	16	1	7	35
348	19	2	4	28
957	14	2	6	33
475	9	1	3	27
98	17	2	0	31
6	15	0	7	38
8	7	2	5	35
274	19	1	3	32
857	15	2	6	37

(3.)

rods	yds.	feet	inches
947	4	1	11
795	2	2	7
472	5	1	10
648	3	2	9
864	4	2	11
79	5	2	8
5	2	1	10

(4.)

574	5	2	10
748	3	1	11
486	2	2	8
947	4	0	10
74	3	2	7
8	1	1	11
5	4	2	6
348	2	1	10
597	5	2	9
48	3	0	11
486	4	2	7
948	2	1	8
582	5	2	10
38	3	2	9

XII.

ADDITION OF SQUARE MEASURE.

N. B. By this rule is found the content of ſuch things as have length and breadth, and its chief uſe is in meaſuring land, flooring, glazing, painting, plumbing, plaiſtering, &c.

Note, 16 Quarters ſquare make 1 Inch, 144 Inches 1 Foot, 9 Feet 1 Yard, 30¼ Yards 1 Rod, 160 Rods 1 Acre of Ground, 100 Feet 1 Square of Flooring, and 172¼ Feet 1 Rod of Brickwork.

Examples are needleſs.

XIII.

ADDITION OF TIME.

N. B. This rule directs how to underſtand the diviſions and denominations of time, and ſhews the beginning, ending, mutation or changing of things, &c.

Note, 60 Seconds make 1 Minute, 60 Minutes 1 Hour, 24 Hours 1 Day and Night, 7 ſuch Days 1 Week, 4 Weeks 1 Month, 13 Months, or 365 Days 1 Year.

Note, In trade and buſineſs 12 calendar months are commonly accounted to make the year, every fourth year has 366 days, and is called a leap year, in which you are to take notice that February hath 29 days.

In order to know how many days there are in each month, obſerve that

Thirty days hath September,
April, June and November:
February twenty-eight alone,
And all the reſt have thirty-one.

(No. 1.)

yrs	*m.*	*w.*	*d.*	*h.*	*min.*	*ſec.*
748	11	2	5	21	57	48
594	8	3	6	18	49	52
79	12	1	4	23	58	43
5	10	2	5	20	47	39
7	9	3	2	22	54	48
64	11	2	6	17	38	57
749	7	1	3	21	56	32
472	4	3	5	23	44	51
58	9	2	2	20	57	38
3	12	1	0	16	38	50
9	10	3	6	22	53	48
846	12	2	4	18	55	39
574	8	0	2	14	7	54

(2.)

yrs	*m.*	*w.*	*d.*	*h.*	*min.*	*ſec.*
974	12	3	6	23	59	47
57	10	1	3	17	34	58
6	8	2	5	21	49	52
9	11	0	2	18	57	49
74	6	3	4	22	53	37
647	10	2	6	19	47	56
974	12	3	2	20	58	47
38	7	1	5	23	38	56
72	9	3	0	7	50	5
9	11	2	1	18	46	55
5	7	3	6	23	57	49
348	12	0	4	20	50	54
793	8	2	5	22	58	44

CHAP. III.

SUBTRACTION.

Sect. I.

Subtraction teacheth to take a leſs number from a greater, by which there appears the exact difference between them.

EXAMPLES.

From	758649	594738	859647
Take	314324	263214	217301

From	684730	7948650	6849730
Take	323215	3217235	2613509

From	9486471	5948062	8074854
Take	3123238	1323729	3521317

From	857046931	694057205	943802510
Take	215730476	237413547	765274819

From	472043080	720574869
Take	094706880	375876490

II.

SUBTRACTION of MONEY.

	l.	*s.*	*d.*	*l.*	*s.*	*d.*	*l.*	*s.*	*d.*
From	74	8	9	81	12	7	942	17	10
Take	31	2	4	37	9	1	175	6	2

From

	l.	s.	d.	l.	s.	d.	l.	s.	d.
From	706	19	11	9047	18	0	7304	17	2
Take	79	7	0	798	4	6	678	0	6
Rec.	8240	19	7	1001	15	9	7002	4	8
Paid	74	1	10	9	0	11	748	14	10
Lent	8130	10	3	1000	0	0	6472	13	5½
Rec.	2007	13	4	874	15	8	1794	17	8¼
Borr.	4021	18	9¾	2400	16	11¼	5070	12	0½
Paid	792	19	11¼	807	17	6½	48	17	10¾
Lent	9000	18	2	1020	0	0	100	0	0
Rec.	700	19	6½	7	19	11¾	0	0	0¼

(No. 1.)

	l.	s.	d.
Borr.	801	10	2½
Paid at diff. times.	47	18	10½
	29	14	11¾
	58	15	8¼
	7	12	4¾
	19	17	10½

(2.)

	l.	s.	d.
Lent	901	5	0½
Received at diff. times.	58	18	11¾
	24	17	10¼
	37	14	8½
	9	19	11¾
	67	13	7½

(3.)

Lent	792	11	9½
Received at diff. times.	78	13	11¾
	36	8	7¼
	5	18	11¾
	8	12	4½
	26	15	10¾
	37	18	11½

(4.)

Borr.	800	0	0¼
Paid at different times.	37	15	11¾
	85	18	9½
	9	12	10¾
	6	19	11¼
	147	13	8¾
	76	18	10½

(5.)

(5.)

	l.	s.	d.
Borrowed	1010	1	0
Paid at different times.	89	16	7¾
	96	19	11¼
	48	13	10½
	79	18	11¾
	8	14	8¼
	37	17	10½
	56	12	7¼
	9	15	11¾
	46	19	7½

(6.)

	l.	s.	d.
Lent	9000	0	0¼
Rec. at different times.	37	19	11¾
	74	14	10
	91	17	11¾
	9	13	9½
	47	17	10¾
	56	8	7¼
	94	19	11½
	76	16	9¾
	87	10	6½

(7.)

Lent	800	10	2½
Rec. at different times.	37	15	11¾
	48	13	10½
	37	19	11¾
	85	18	9½
	79	16	11¾
	74	14	10
	9	12	6½
	78	14	8¼
	91	17	11¾

(8.)

Borr.	901	11	9½
Paid at different times.	46	19	11¼
	37	17	10½
	69	13	9¾
	47	15	8¼
	56	12	7½
	72	17	10¾
	76	18	10½
	56	12	7¼
	58	15	8½

III.

SUBTRACTION OF TROY-WEIGHT.

	lb.	oz.	dwts.	gr.	lb.	oz.	dwts.	gr.
Bought	471	10	18	21	901	7	14	15
Sold	201	3	0	7	38	11	3	0
Bought	800	3	17	0	709	0	7	0
Sold	7	8	4	18	48	10	14	21

(1.)

	lb.	oz.	dwts.	gr.
Bought	7160	1	3	0
Sold at different times.	472	11	17	21
	259	7	14	18
	74	10	16	23
	57	8	19	20
	9	10	14	17
	105	7	12	21
Sold in all				
Unſold				

(2.)

lb.	oz.	dwts.	gr.
9010	2	0	1
287	10	15	21
537	9	17	23
74	11	14	19
9	7	19	14
7	8	13	23
734	10	18	20

(3.)

Bought	9020	1	0	3
Sold at different times.	47	10	14	20
	79	11	18	23
	385	9	13	18
	574	10	18	22
	748	7	15	17
	64	11	19	21
	38	8	14	22
	9	10	17	20
	3	7	13	23
	245	10	16	7
Sold in all				
Unſold				

(4.)

7001	0	1	0
274	10	14	21
492	7	19	18
76	11	12	23
84	9	16	19
57	10	17	22
148	8	15	18
437	11	8	20
24	7	18	21
9	10	14	17
5	9	7	20

(5.)

Bought	8110	11	0	0
Sold at different times.	387	11	12	21
	74	10	18	20
	9	7	9	23
	5	10	17	19
	47	11	19	15
	374	9	13	21
	97	10	16	14
	59	7	9	8
	7	11	15	22
	4	9	18	17
Sold in all				
Unſold				

(6.)

9000	0	0	0
74	10	15	20
38	11	17	23
51	9	12	20
472	11	19	21
248	10	14	22
574	7	16	21
96	4	18	23
35	11	14	20
357	9	19	22
75	10	12	19

IV.

SUBTRACTION OF AVOIRDUPOIS WEIGHT.

	tuns	*cwt.*	*qrs*	*lb.*	*oz.*
Bought	91	12	1	18	11
Sold	47	14	3	12	5

	tuns	*cwt.*	*qrs*	*lb.*	*oz.*
Bought	82	13	2	12	0
Sold	36	4	0	20	4

From	70	15	1	7	14
Take	9	18	2	18	15

From	80	0	0	0	0
Take	7	14	1	10	10

(1.)

Bought	507	3	1	9	4
Sold at different times.	28	14	2	24	12
	19	17	3	27	14
	12	15	1	23	10
	18	12	2	25	15
	37	16	3	21	11
	59	19	1	24	14
Sold in all					
Unſold					

(2.)

710	1	0	2	0
47	17	2	24	13
72	13	3	19	11
9	18	1	25	14
5	14	2	21	12
17	8	3	7	10
38	10	0	20	15
24	15	2	25	11

V.

SUBTRACTION OF APOTHECARIES WEIGHT.

	lb.	*oz.*	*dr.*	*ſc.*	*gr.*
From	704	7	5	1	12
Take	257	3	2	2	7

	lb.	*oz.*	*dr.*	*ſc.*	*gr.*
From	801	4	2	0	14
Take	74	10	5	1	17

From	635	9	0	0	10
Take	8	11	4	2	0

From	900	0	0	0	0
Take	0	0	0	0	12

(1.)

	lb.	*oz.*	*dr.*	*ſc.*	*gr.*
Bought	701	1	0	1	0
Sold at different times.	47	10	4	2	14
	28	7	6	1	18
	9	11	3	2	15
	47	9	5	1	17
	64	8	7	2	19
	76	10	2	1	13
	84	7	5	0	18
Sold in all					
Unſold					

(2.)

	lb.	*oz.*	*dr.*	*ſc.*	*gr.*
Bought	900	0	1	0	0
Sold at different times.	38	11	5	2	17
	27	8	3	1	14
	9	10	7	2	19
	47	7	4	0	7
	64	11	6	2	17
	94	10	3	1	14
	147	7	5	2	18
Sold in all					
Unſold					

VI.

SUBTRACTION OF DRY MEASURE.

(1.)

	loads	*qrs*	*buſh.*	*pecks*
Bought	701	1	3	0
Sold at different times.	47	4	7	3
	74	2	5	1
	197	3	6	2
	38	4	3	3
	48	3	7	2
	174	4	0	1
Sold in all				
Unſold				

(2.)

	loads	*buſh.*	*pecks*	*pints*
Bought	901	17	0	0
Sold at different times.	137	39	3	15
	59	27	1	12
	34	36	3	14
	49	38	2	11
	74	32	3	12
	96	29	3	13
Sold in all				
Unſold				

VII.

VII.

SUBTRACTION OF LIQUID MEASURE.

(1.)

	tuns	*pipes*	*hhds*	*gall.*
Bought	190	0	1	0
Sold at different times.	18	1	1	58
	7	1	1	47
	39	0	1	59
	26	1	1	61
	8	1	0	57
	23	1	1	49
Sold in all				
Unſold				

(2.)

	hhds	*gall.*	*pints*
Bought	901	2	0
Sold at different times.	74	57	5
	38	62	7
	9	48	4
	16	39	6
	74	56	2
	35	47	5
Sold in all			
Unſold			

VIII.

SUBTRACTION OF WINCHESTER MEASURE.

(1.)

	butts	*hhds*	*½bar.*	*kil.*	*fir.*	*gall.*
Bought	91	1	0	1	0	1
Sold at different times.	9	0	2	1	1	7
	18	1	1	1	1	5
	7	1	2	1	1	8
	14	1	2	1	1	6
	9	1	1	1	1	7
	22	1	2	1	1	5
Sold in all						
Unſold						

(2.)

	hhds	*½bar.*	*gall.*
Bought	901	2	0
Sold at different times.	59	2	32
	78	1	29
	17	2	34
	9	1	35
	16	2	24
	9	1	27
Sold in all			
Unſold			

IX.

SUBTRACTION OF CLOTH MEASURE.

	(1.)			(2.)			(3.)		
	yards	*qrs*	*nails*	*E. ells*	*qrs*	*nails*	*Fl. ells*	*qrs*	*nails*
Bo^t.	701	1	2	79	4	0	72	0	0
Sold at different times.	57	3	3	4	3	1	5	2	3
	9	2	1	2	4	3	7	1	2
	5	1	0	7	3	2	3	2	1
	24	3	2	12	1	0	12	1	3
	8	2	1	9	2	3	6	2	1
	5	3	3	10	1	2	4	0	2
	7	2	1	4	4	3	17	2	3
Sold in all									
Unſold									

X.

SUBTRACTION OF LAND MEASURE.

	acres	*roods*	*rods*	*½ yds*		*acres*	*roods*	*rods*	*½ yds*
From	907	1	34	7	From	800	0	0	0
Take	59	2	37	9	Take	9	2	27	3

XI.

SUBTRACTION OF LONG MEASURE.

	deg.	*leag.*	*mil.*	*fur.*	*rods*		*rods*	*yds*	*feet*	*inches*
From	472	3	1	3	24	From	900	0	0	0
Take	47	14	2	5	35	Take	74	3	1	10

XII.

SUBTRACTION of TIME.

	years	*mon.*	*wks*	*days*	*hrs*	*min.*	*ſec.*
From	901	4	1	2	14	48	52
Take	99	10	2	5	18	0	56

	years	*mon.*	*wks*	*days*	*hrs*	*min.*	*ſec.*
From	100	0	0	0	0	0	0
Take	9	0	3	0	7	0	3

XIII.

QUESTIONS to exercise SUBTRACTION.

1. Suppoſe you are now 13 years old, can you tell me what year you were born in, this being 1789?—Anſ. 1776.

2. Can you tell me how old John is, who was born in the year 1754, this being the year 1770?—Anſ. 16 years.

3. King Henry the Eighth died in the year 1547, I demand how many years ſince, we being now in the year 1770?—Anſwer 223.

4. What number is it which if you add it to 673134 will make 749080?—Anſ. 75946.

5. A merchant bought 120 hogſheads of tobacco, weighing 648 cwt. 0 qrs. 24 lb. of which he ſells 70 hogſheads, weighing 399 cwt. 2 qrs. 25 lb. I demand how many hogſheads he has ſtill left, and what they weigh?—Anſ. 50 hhds, weight 248 cwt. 1 qr. 27 lb.

6. A merchant in Ireland bought 600 ſalt ox-hides, weighing 561 cwt. 0 qrs. 2 lb. of which he ſhipt off for England 250 hides, weighing 239 cwt. 3 qrs. 25 lb. Let me know how many hides he has left, and what they weigh?—Anſ. 350 hides, weight 321 cwt. 0 qrs. 5 lb.

7. A ſilverſmith had 1 ſilver tankard and 2 ſilver cups, which weighed together 3 lb. 7 oz. 18 dwts. he firſt

ſold one of the cups that weighed 1 lb. 12 dwts. after that he ſold another that weighed 10 oz. 6 dwts. 14 gr. I demand the weight of the tankard that was left?—Anſ. 1 lb. 8 oz. 19 dwts. 10 grains.

8. Suppoſe London, Bath and Briſtol lie in a ſtraight line, and the diſtance between London and Briſtol to be 120 miles, and the diſtance between London and Bath 107 miles, I demand the diſtance between Bath and Briſtol?—Anſ. 13 miles.

9. Jacob by contract was to ſerve Laban for his two daughters 14 years: now when he had accompliſhed 11 years, 11 months, 11 weeks, 11 days, 11 hours, and 11 minutes, let me know how long he had ſtill to ſerve?—Anſ. 1 year, 11 months, 3 weeks, 2 days, 12 hours, 49 minutes.

10. What time is there between the eclipſe which happened in the year 1715, the 22d day of April, at 30 minutes paſt ſeven in the morning, and the eclipſe which happened in the year 1724, the 11th of May, at 9 minutes after 5 in the afternoon?—Anſ. 9 years, 20 days, 9 hours, 39 minutes.

MULTIPLI-

MULTIPLICATION TABLE.

2 times or twice	1	is	2
	2	—	4
	3	—	6
	4	—	8
	5	—	10
	6	—	12
	7	—	14
	8	—	16
	9	—	18
	10	—	20
	11	—	22
	12	—	24
3 times	3	—	9
	4	—	12
	5	—	15
	6	—	18
	7	—	21
	8	—	24
	9	—	27
	10	—	30
	11	—	33
	12	—	36
4 times	4	—	16
	5	—	20
	6	—	24
	7	—	28
	8	—	32
	9	—	36
	10	—	40
	11	—	44
	12	—	48
5 times	5	—	25
	6	—	30
	7	—	35
	8	—	40
	9	—	45
	10	—	50
	11	—	55
	12	—	60
6 times	6	is	36
	7	—	42
	8	—	48
	9	—	54
	10	—	60
	11	—	66
	12	—	72
7 times	7	—	49
	8	—	56
	9	—	63
	10	—	70
	11	—	77
	12	—	84
8 times	8	—	64
	9	—	72
	10	—	80
	11	—	88
	12	—	96
9 times	9	—	81
	10	—	90
	11	—	99
	12	—	108
10 times	10	—	100
	11	—	110
	12	—	120
11 times	11	—	121
	12	—	132
12 times	12	—	144

CHAP. IV.

MULTIPLICATION.

SECT. I.

MULTIPLICATION ſerves inſtead of many additions, and conſiſts of three terms, viz.

Multiplicand	12
Multiplier	7
and Product	84

Note, To prove multiplication, multiply half the multiplicand by double the multiplicator, or half the multiplicator by double the multiplicand.

Multiply the following ſums, viz.

314251	526314	742516	382735
2	3	4	5
641753	5748635	6827594	4982638
6	7	8	9
7493827	9285096	8479286	
10	11	12	

II.

Multiply the following ſums, viz.

Multiply	74635728	Multiply	58375294
by	24	by	35
	298542912		
	149271456	Multiply	39482753
		by	46
Anſ.	1791257472		

Multiply

Multiply	648594709	479486095	847953857
by	67	78	89

III.

Multiply	587486374	748639475	493857409
by	324	425	579
	2349945496		
	1174972748		
	1762459122		

Multiply	874907509	794869574	947087949
by	879	987	594

Multiply	174869573	957468075	837948576
by	5174	9408	8709

IV.

Multiply	68472509	940860758	859074090
by	490870	950708	860970

V.

Multiply	7498040	80070409
by	10	1000

Multiply	9480740	57009580
by	100	12000

VI.

Multiply	49008600	948007908
by	79800	807600

Multiply 80079004 | 71080940
by 869000 | 9087000

VII.

Multiply 397480640 | 748009570
by 700859000 | 975008000

Multiply 968400790
by 170087000

VIII.

THE USE OF MULTIPLICATION.

Of Money.

Pounds multiplied by twenty are ſhillings.
Shillings multiplied by twelve are pence.
Pence multiplied by four are farthings.

Of Avoirdupois Weight.

Tuns multiplied by twenty are hundreds.
Hundreds multiplied by four are quarters.
Quarters multiplied by twenty-eight are pounds.
Pounds multiplied by ſixteen are ounces.
Ounces multiplied by ſixteen are drams.

Of Troy-Weight.

Pounds multiplied by twelve are ounces.
Ounces multiplied by twenty are pennyweights.
Pennyweights multiplied by twenty-four are grains.

Of Apothecaries Weight.

Pounds multiplied by twelve are ounces.
Ounces multiplied by eight are drams.
Drams multiplied by three are ſcruples.
Scruples multiplied by twenty are grains.

Of Dry Meaſure.

Loads multiplied by five are quarters.
Quarters multiplied by eight are buſhels.
Buſhels multiplied by four are pecks.
Pecks multiplied by ſixteen are pints.

Of Liquid Meaſure.

Tuns multiplied by four are hogſheads.
Hogſheads multiplied by ſixty-three are gallons.
Gallons multiplied by four are quarts.
Quarts multiplied by two are pints.

Of Wincheſter Meaſure.

Tuns multiplied by two are butts.
Butts multiplied by three are barrels.
Barrels multiplied by thirty-ſix are gallons.
Gallons multiplied by eight are pints.

Of Cloth Meaſure.

Yards multiplied by four are quarters.
Quarters multiplied by four are nails.
Ells Engliſh multiplied by five are quarters.
Ells Flemiſh multiplied by three are quarters.
French Ells multiplied by ſix are quarters.

Of Land Meaſure.

Acres multiplied by four are roods.
Roods multiplied by forty are rods.
Rods multiplied by five and a half are yards.
Yards multiplied by two are half yards.

Of Long Meaſure.

Degrees multiplied by ſixty are miles.
Miles multiplied by eight are furlongs.
Furlongs multiplied by forty are rods.
Rods multiplied by ſixteen and a half are feet.
Feet multiplied by twelve are inches.

Of Time.

Years multiplied by three hundred and ſixty-five are days.
Days multiplied by twenty-four are hours.
Hours multiplied by ſixty are minutes.
Minutes multiplied by ſixty are ſeconds.

IX.

1. How many ſhillings in 20l. Anſwer 400.
2. How many ſhillings in 35l. Anſwer 700.
3. In 984l. how many ſhillings? Anſwer 19680.
4. I demand how many ſhillings are in 45l. 18s. Anſwer 918.
5. How many ſhillings in 507l. 19s. Anſwer 10159.
6. How many pence in 20l. Anſwer 4800.
7. In 48l. 10s. how many pence? Anſwer 11640.
8. I demand how may pence in 509l. 19s. 11. Anſwer 122399d.
9. How many farthings in 40l. 13s. 8½d. Anſwer 39058.
10. In 99l. 19s. 11¾d. tell me how many farthings. Anſwer 95999.
11. At 12 plums for a penny, how many is that for 18 pence? Anſwer 216.
12. At 2 eggs for a penny, how many can I have for 5 ſhillings? Anſwer 120.

X.

TROY WEIGHT.

13. In 540 lb. how many ounces? Anſwer 6480.
14. How many ounces in 720 lb. 10 oz. Anſwer 8650.
15. Let me know how many pennyweights are in 472 lb. 7 oz. 5 dwts. Anſwer 113425.
16. Tell me how many grains in 348 lb. 9 oz. 14 dwts. 18 gr. Anſwer 2009154.
17. If I can buy 5 apples for 1 penny, how many can I have for 40 pence? Anſwer 200.
18. When I can buy 12 marbles for 1 penny, how many can I get for 4 ſhillings? Anſwer 576.

XI.

AVOIRDUPOIS WEIGHT.

19. How many quarters in 478 cwt.

4

Anſw. 1912

20. In 574 cwt. 2 qrs. how many quarters? Anſwer 2298.

21. Let me know how many lb. are in 49cwt. 3qrs. 12lb. Anſwer 5584.

22. Tell me how many lb. in 54cwt. 2qrs. 18lb. Anſwer 6122.

23. How many lb. in 100 cwt. 0 qrs. 14lb. Anſ. 11214.

24. At 5d. the lb. for raiſins, how many pence muſt I pay for 112lb. Anſwer 560.

25. How many pence muſt I pay for 20 doz. of oranges at 18d. the dozen? Anſwer 360.

XII.

APOTHECARIES WEIGHT.

6. How many ounces in 587lb. Anſwer 7044.

27. How many drams in 948lb. 10 oz. Anſwer 91088.

28. In 8074lb. 10 oz. how many ſcruples? Anſ. 232552.

29. Let me know how many grains are in 8720lb. 8 oz. 4 dr. 2 ſcru. Anſwer 50231320.

30. How many pence will pay for a poſt-chaiſe from London to Cheſter, allowing the diſtance to be 200 miles, and at 9d. each mile? Anſwer 1800.

XIII.

DRY MEASURE.

31. In 120 loads of wheat, how many quarters?

120
5

Anſ. 600

32. How many buſhels in 437 loads, 2 qrs. 5 buſh. Anſwer 17501.

33. Let me know how many pecks are in 230 loads, 32 buſhels and 2 pecks. Anſwer 36930.

34. How many pence will pay for 1 load of wheat at 16d. the peck? Anſwer 2560.

XIV.

LIQUID MEASURE.

35. In 740 tuns, how many hogſheads?

740
4

Anſ. 2960

36. How many hogſheads in 936 tuns, 1 pipe? Anſwer 3746.

37. In 48 tuns, 3 hogſheads, how many gallons? Anſwer 12285.

38. Let me know how many pints in 12 tuns, 2 hogſheads, 48 gallons. Anſwer 25584.

39. Sir Bob Gouty, Sir Peter Sott, and ſix more, drink two bottles of wine (each) every day; how many bottles will they all drink in a year of 365 days? Anſwer 5840.

XV.

WINCHESTER MEASURE.

40. How many barrels in 7482 tuns? Anſwer 44892.

2

14964
3

44892

41. In 46 tuns, 1 butt, 2 barrels, how many gallons? Anſwer 10116.

42. Let me know how many quarts in 50 tuns, and 34 gallons of beer. Anſwer 43336.

43. John, Peter, Iſaac, and 9 more drink 3 pints of beer (each) every day; I demand how many pints will they all drink in 20 weeks, each week 7 days. Anſwer 5040.

XVI.

CLOTH MEASURE.

44. How many nails in 594 yards ? Anſwer 9504.

```
 594
   4
----
2376
   4
----
9504
```

45. In 740 yards and 3 nails, how many nails ? Anſwer 11843.
46. How many nails in 472 Engliſh ells ? Anſwer 9440.
47. In 1000 ells Flemiſh, how many nails ? Anſwer 12000.
48. If 132 charity children are allowed 4 yards each of coarſe cloth for their clothing, tell me how many nails all contains. Anſwer 8448.

XVII.

LAND MEASURE.

49. How many roods in 804 acres and 2 roods ? Anſwer 3218.
50. In 748 acres 3 roods, how many rods ? Anſ. 119800.
51. Tell me how many yards in 59 acres and 38 rods. Anſwer 52129.
52. A farmer holds a piece of ground which is divided into 8 cloſes that contain 8 acres each, tell me how many rods in the whole farm. Anſwer 10240.
53. A farm of land is divided into 20 cloſes, 10 of them have 10 acres in each, and the other 10 cloſes 8 acres each, how many rods does all contain ? Anſwer 28800.

XVIII.

LONG MEASURE.

54. How many leagues in 999 degrees, 14 leagues ? Anſwer 19994.

55. In 1004 degrees, 18 leagues, 2 miles, how many miles? Anſwer 60296.

56. How many miles in 728 degrees, 54 miles? Anſwer 43734.

57. In 370 miles, how many rods? Anſwer 118400.

58. How many yards from London to Briſtol, ſuppoſing the diſtance to be 120 miles? Anſwer 211200.

59. How many barley-corns would reach round the globe of the earth, allowing the circumference to be 25020 miles? Anſwer 4755801600 barley-corns.

XIX.

TIME.

60. How many days in 684 years, 7 months, 3 weeks and 4 days? Anſwer 249197.

61. In 440 years, 10 months, 2 weeks, 5 days, how many hours? Anſwer 3851016.

62. King Henry the Eighth died in the year 1547; I demand how many minutes ſince, this being the year 1769? Anſwer 116363520.

COMPOUND MULTIPLICATION.

SECT. XX.

1. What muſt I pay for 7 pair of gloves at 1s. 4d. the pair? Anſwer 9s. 4d.

2. Let me know what 9 pair of ſhoe buckles come to at 1s. 6d. the pair. Anſwer 13s. 6d.

3. I want to know what 10 pair of ſleeve buttons come to at 1s. 7d. the pair. Anſwer 15s. 10d.

4. At 1s. 11d. the pound what will 12 pound of ſugar come to? Anſwer 1l. 3s.

XXI.

5. What will 14 dozen of oranges come to at 2s. 3d. the dozen? Anſwer 1l. 11s. 6d.

6. When I pay 1s. 4d. for a half peck loaf, the baker ſays

I owe him for 16 loaves at that rate, how much muſt I pay him? Anſwer 1l. 1s. 4d.

7. A company drinks at a tavern 1½ dozen bottles of wine at 2s. 6d. the bottle; tell me how much the landlord's bill comes to? Anſwer 2l. 5s.

8. At 2s. 8d. for one pair of ſtockings, what would 20 pair come to? Anſwer 2l. 13s. 4d.

9. Let me know the amount of 24 yards of linen at 2s. 10¼d. the yard. Anſwer 3l. 8s. 6d.

10. What muſt I pay for 27 dozen of oranges at 3s. 1½d. the dozen? Anſwer 4l. 4s. 4½d.

11. What muſt I pay for 2½ dozen ſilk handkerchiefs at 3s. 5¾d. for each handkerchief? Anſwer 5l. 4s. 4½d.

12. Let me know what will 35lb. of tea come to at 3s. 11¾d. the lb. Anſwer 6l. 19s. 3¼d.

13. A journeyman requires to know how much his wages come to for 6 weeks, each week 6 days, at 4s. 4¾d. each day. Anſwer 7l. 18s. 3d.

XXII.

14. Caſt up the price of 37 yards of linen at 4s. 9¾d. the yard. Anſwer 8l. 18s. 0¾d.

	s.	*d.*
	4	9¾
		6
1	8	10½
		6
8	13	3
	4	9¾
£.8	18	0¾

15. If I ſpend 4s. 10¾d. a day, what will it amount to in 41 days? Anſwer 10l. 0s. 8¾d.

16. What is the amount of 45 yards of cambrick at 7s. 7¾d. the yard? Anſwer 17l. 4s. 0¾d.

17. Caſt up the price of 47 yards of ſattin at 9s. 10½d. the yard. Anſwer 23l. 4s 1½d.

18. In Ireland their half guineas paſs at 11s. 4½d. each, tell me what 52 of them come to. Anſ. 29l. 11s. 6d.

19. A butcher bought 55 ſheep at 15s. 9½d. each; he paid for driving, and other expences 19s. 11½d. let me know what all comes to. Anſwer 44l. 8s. 6d.

20. A farmer in Kent took a piece of land, conſiſting of 59 acres, at 19s. 11¾d. the acre; can you let me know how much he pays? Anſwer 58l. 18s. 9¼d.

21. A cheeſemonger bought 62 flitches of bacon, which coſt him, one with the other, 1l. 1s. 1½d. each: let me know what they all come to. Anſ. 65l. 9s. 9d.

22. In Ireland guineas paſs at 1l. 2s. 9d. each; I want to know how much 65 of them make. Anſwer 73l. 18s. 9d.

23. A merchant in London receives advice from his correſpondent in Dublin, that he ſhipt for his account on board the True Briton, 69 barrels of beef at 1l. 4s. 10¾d. the barrel; let me know the amount. Anſwer 85l. 17s. 9¾d.

24. Suppoſe a journeyman taylor works every week in the year, and earns each week 18s. 11½d. I want to know what it comes to at the year's end. Anſwer 49l. 5s. 10d.

25. What is the amount of 72 yards of ſuperfine cloth at 1l. 5s. 11½d. the yard? Anſwer 93l. 9s.

26. When I pay 1l. 12s. 10¾d. for one firkin of butter, how much muſt I pay for 78 firkins at the ſame rate? Anſwer 128l. 5s. 10½d.

22. What come 81 loads of hay to at 2l. 12s. 10½d. the load? Anſwer 214l. 2s. 10½d.

28. A merchant in London bought 85 caſks of Iriſh butter, which ſtands him in 1l. 19s. 11½d. the caſk; caſt up the whole amount. Anſwer 169l. 16s. 5½d.

29. A hoſier in London receives from his correſpondent in Scotland, 89 dozen of knit hoſe, with an account of their ſtanding him in 2l. 11s. 6¾d. the dozen; let me know what all comes to. Anſwer 229l. 9s. 0¾d.

30. Let me know how much muſt be paid for 96 pieces of linen at 2l. 15s. 10½d. the piece. Anſwer 268l. 4s.

31. A publican agrees with a brewer to deliver him in 98 butts of beer at 5l. 19s. 11¾d. the butt; I want to know how much the publican is to pay. Anſ. 587l. 17s. 11½d.

32. Suppoſe I buy 103cwt. of merchandize at 6l. 14s. 8½d.

the cwt. can you make up what they come to? Anſ. 693l. 14s. 11½d.

33. A taylor contracts for the clothing 107 of his majeſty's regiment of light horſe, at 6l. 17s. 10½d. each man: I want to know what the taylor's bill amounts to. Anſwer 737l. 12s. 7½d.

34. A victualler bought in Smithfield 114 fat cows, for which he paid, one with the other, 6l. 19s. 11¾d. I demand what they all came to. Anſwer 797l. 17s. 7½d.

35. A watchmaker in London has 119 ſilver watches, which he values at ſix guineas and a half each: let me know what they all come to at that rate. Anſwer 812l. 3s. 6d.

36. At taking the Havannah laſt war, there were found in a cheſt 129 ingots of ſilver, computed to be worth, one with the other, 7l. 18s. 11¾d. each, what were they all worth? Anſwer 1025l. 8s. 3¾d.

37. There was taken laſt war a Spaniſh ſhip, by an Engliſh privateer, that had on board the captain and 132 men; the owners generouſly divided the prize in the following manner, viz. to each of the men 8l. 13s. 9½d. and to the captain 200 guineas: I demand the ſhip's value. Anſwer 1357l. 0s. 6d.

38. A gentleman has on his eſtate 143 oak trees, 132 of them are valued at 8l. 18s. 11¾d. each, and the reſt at 5l. 14s. 10½d. each. Now let me know what they all amount to at the above valuation. Anſwer 1244l. 8s. 10¼d.

39. A nobleman at the time of his death ordered a charity of 10l. 15s. 10½d. to be given to each of 144 poor men, and 7 guineas to each of 40 poor widows, all of them in the pariſh he lived in. Let me know how much money was ſufficient to pay them. Anſwer 1848l. 6s.

40. By one of our Engliſh privateers there was taken laſt war a French ſhip whoſe value was divided as follows, viz. to each of 144 ſailors, 12l. 19s. 11¾d. to 4 officers 400 guineas, and twice as much as the 4 officers to the captain. Now I want to know the value of the ſhip. Anſwer 3131l. 17s.

CHAP.

CHAP. V.

OF DIVISION.

SECT. I.

DIVISION teacheth to find how often one number is contained in another, and conſiſts of four parts, viz. Dividend, Diviſor, Quotient, and Remainder.

Note, The remainder muſt be always leſs than the diviſor, and will be of the ſame name with the dividend.

How often goes two in 4862450? Anſwer 2431225.

2)4862450

Anſwer 2431225
2

Proof 4862450

Divide the following ſums.

63942936 by 3
84645284 by 4
5738[illegible]428 by 2
73271580 by 5
97482786 by 6
86908220 by 7

98764848 by 8
12905190 by 9
74986472 by 8
38748639 by 11
52158472 by 12
80430800 by 12

II.

How often does 13 go in 301782?

13)301782(23214 Anſwer.
26.... 13

41 69642
39 23214

27 301782 Proof.
26

18
13

52
52

Divide 67128138 by 14
97289205 by 15
99394733 by 17
67884131 by 19
68310600 by 24
168935373 by 35
298344454 by 46
74059875 by 75
527919168 by 84
432813429 by 87
622344192 by 96
635603402 by 98

III.

Divide 71244368 by 124
81369690 by 235
64872584 by 257
92648638 by 279
57482642 by 436
74625758 by 625
85264739 by 584
26857394 by 628
17586947 by 752
62857496 by 798
94765842 by 859
39748637 by 978

IV.

Divide 472684724 by 1352
628547436 by 1768
379486384 by 2847
743864937 by 2758
286475874 by 5287
479649536 by 6579
748694725 by 7294
974865842 by 6849
387586387 by 8075
746359473 by 7968
285746285 by 9476
759684727 by 9786

V.

Divide 8472864987 20 by 10
594868394380 by 20
847285473740 by 30
904072648350 by 40
706004872840 by 50
487286498000 by 60
974658007050 by 70
194864728000 by 80
587468507000 by 90
204057462800 by 100
849648325000 by 110
173869472000 by 120

VI.

Divide 748632084700 by 572800
974857260409 by 758600
286400724609 by 947800
572800368042 by 879400
948647284973 by 4972000
759486472864 by 9075000

VII.

VII.

THE USE OF DIVISION.

Of Money.

Farthings divided by 4 are pence.
Pence divided by 12 are ſhillings.
Shillings divided by 20 are pounds.

Of Avoirdupois Weight.

Drams divided by 16 are ounces.
Ounces divided by 16 are pounds.
Pounds divided by 28 are quarters.
Quarters divided by 4 are hundreds.
Hundreds divided by 20 are tuns.

Of Troy Weight.

Grains divided by 24 are pennyweights.
Pennyweights divided by 20 are ounces.
Ounces divided by 12 are pounds.

Of Apothecaries Weight.

Grains divided by 20 are ſcruples.
Scruples divided by 3 are drams.
Drams divided by 8 are ounces.
Ounces divided by 12 are pounds.

Of Dry Meaſure.

Pints divided by 16 are pecks.
Pecks divided by 4 are buſhels
Buſhels divided by 8 are quarters.
Quarters divided by 5 are loads.

Of Liquid Meaſure.

Pints divided by 2 are quarts.
Quarts divided by 4 are gallons.
Gallons divided by 63 are hogſheads.
Hogſheads divided by 4 are tuns.

Of Wincheſter Meaſure.

Pints divided by 8 are gallons.
Gallons divided by 36 are barrels.
Barrels divided by 3 are butts.
Butts divided by 2 are tuns.

Of

Of Cloth Meaſure.

Nails divided by 4 are quarters.
Quarters divided by 4 are yards.
Quarters divided by 5 are Engliſh ells.
Quarters divided by 3 are ells Flemiſh.
Quarters divided by 6 are French ells.

Of Land Meaſure.

Yards divided by 5½, or ½ yards divided by 11 are rods.
Rods divided by 40 are roods.
Roods divided by 4 are acres.

Of Long Meaſure.

Inches divided by 12 are feet.
Feet divided by 16½ are rods.
Rods divided by 40 are furlongs.
Furlongs divided by 8 are miles.
Miles divided by 60 are degrees.

Of Time.

Seconds divided by 60 are minutes.
Minutes divided by 60 are hours.
Hours divided by 24 are days.
Days divided by 365 are years.

VIII.

OF MONEY.

1. In 400 ſhillings how many pounds? Anſ. 20l.

2|0)40|0

Anſwer 20

2. How many pounds in 700 ſhillings? Anſwer 35l.
3. Let me know how many pounds are in 19680 ſhillings. Anſwer 984l.
4. In 27472 ſhillings how many pounds? Anſ. 1373l. 12s.
5. I demand how many pounds in 353280 pence. Anſ. 1472l.
6. How many pounds in 618948 pence? Anſ. 2578l. 19s.
7. In 122399 pence how many pounds? Anſwer 509l. 19s. 11d.

8. How many pounds in 719888 farthings? Anſwer 749l. 17s. 8d.

9. Tell me how many pounds are in 863999 farthings. Anſ. 899l. 19s. 11¾d.

10. In 192933 halfpence how many pounds? Anſwer 401l. 18s. 10½d.

11. A poor man who begged alms on London-Bridge made up 5 bags of farthings, each bag contained 1111 farthings. Now let me know how many pounds all were worth. Anſwer 5l. 15s. 8¾d.

12. Another poor man at the time of his death had 2 bags and a purſe; in the firſt bag were found 1960 farthings, in the ſecond 879 pence, and in the purſe 100 ſhillings. I demand how many pounds all contained. Anſwer 10l. 14s. 1d.

IX.

TROY WEIGHT.

13. In 4536 ounces of ſilver how many pounds? Anſ. 378lb.

14. How many pounds in 104963 ounces? Anſwer 8746lb. 11oz.

15. Let me know how many pounds in 142734 pennyweights. Anſwer 594lb. 8oz. 14dwts.

16. In 4578717 grains how many pounds? Anſwer 794lb. 10oz. 19dwts. 21gr.

17. How many pounds in 1347840 grains? Anſwer 234lb.

18. Let me know how many pounds in 5690879 grains. Anſwer 987lb. 11oz. 19dwts. 23 grains.

19. A youth aſked a ſilverſmith what a ſilver cup he ſaw in his ſhop weighed; ſays the ſilverſmith, you'll ſoon make up its exact weight when I tell you that it weighs 23 grains for every day in the year. Anſwer 1lb. 5oz. 9dwts. 19 grains.

20. The ſilverſmith finding the youth expert, propoſed to him as follows, viz. Theſe 5 ingots of ſilver weigh juſt as many pennyweights as there are pints in a load of wheat; this cup, ſpoons, &c. as many penny-

weights as there are pints in a tun of wine; and theſe ſix ingots of ſilver as many grains as there are yards in a degree. Now let me know how many pounds they all weigh together. Anſwer 37 lb. 4 oz. 16 dwts.

X.

AVOIRDUPOIS WEIGHT.

21. How many hundreds in 3388 quarters? Anſwer 847 cwt.
22. In 3794 qrs how many hundreds? Anſ. 948 cwt. 2 qrs.
23. Let me know how many hundreds 88116 lb. make. Anſ. 786 cwt. 3 qrs.
24. How many tuns in 77833 lb? Anſ. 34 tuns, 14 cwt. 3 qrs. 21 lb.
25. I want to know how many tuns are in 447999 lb. Anſwer 199 tuns, 19 cwt. 3 qrs, 27 lb.
26. A cheeſemonger bought of a farmer 121 flitches of bacon, which weighed, one with the other, 49 lb. each; 132 firkins of butter, weight 56 lb. each; and 144 cheeſes weighing 29 lb. each. Now let me know how many tuns all weighed. Anſwer 7 tuns, 16 cwt. 0 qrs, 25 lb.

XI.

APOTHECARIES WEIGHT.

27. In 5952 ounces how many pounds? Anſ. 496 lb.
28. How many pounds in 10775 ounces? Anſ. 897 lb. 11 oz.
29. I want to know how many pounds are in 91093 drams. Anſwer 948 lb. 10 oz. 5 dr.
30. Let me know how many pounds are in 719039 drams. Anſwer 7489 lb. 11 oz. 7 dr.
31. In 168110 ſcruples how many pounds? Anſwer 583 lb. 8 oz. 4 dr. 2 ſcr.
32. How many pounds are in 518400 grains? Anſwer 900 lb.
33. An apothecary bought a parcel of goods that weighed, when reduced to ounces, 11712 ounces; another parcel, when reduced to drams, made 72576 drams; and ano-

ther parcel, when reduced to ſcruples, made 244512. Now let me know how many pounds the 3 parcels weighed. Anſwer 2581.

XII.

DRY MEASURE.

34. In 423984285 quarters of wheat, how many loads? Anſwer 84796857.

35. How many loads are in 379034 buſhels? Anſwer 9475 loads, 34 buſhels.

36. I want to know how many loads are in 1518012 pecks. Anſwer 9487 loads, 2 qrs, 7 buſhels.

37. Let me know how many loads are in 122800 pints of peas. Anſwer 47 loads, 38 buſhels, 3 pecks.

38. A farmer allows for the ſupport of his family 3 pecks of wheat every day in the year, for his horſes 7 buſhels of oats every week in the year, and for his hogs 1 quarter of peas every month in the year. Now I demand how many loads of grain they all devour in the year? Anſwer 18 loads, 21 buſhels, 3 pecks.

Note, 13 months is allowed to the year.

XIII.

LIQUID MEASURE.

39. In 1894568 pipes how many tuns? Anſ. 947284.

40. Let me know how many tuns 1989947 hogſheads make. Anſ. 497486 tuns, 3 hhds.

41. How many tuns are in 1078483 gallons? Anſwer 4279 tuns, 2 hhds, 49 gallons.

42. In 1965565 pints how many tuns? Anſ. 974 tuns, 1 pipe, 1 hhd, 58 gall. 5 pints.

43. An inn-keeper in London has a monthly meeting of gentlemen, which conſiſts of 120 members, each member drinks 3 pints of wine at every meeting. Now let me know how many hogſheads will they all drink in a year and a half, allowing 12 months to the year. Anſwer 12 hhds, 54 gall.

XIV.

XIV.

WINCHESTER MEASURE.

44. In 749684752 butts how many tuns? Anſwer 374842376 tuns.

45. How many tuns in 94728649 hogſheads of beer? Anſwer 23682162 tuns, 1 hhd.

46. Bring 874964728 barrels into butts and tuns. Anſ. 145827454 tuns, 1 butt, 1 barrel.

47. Let me know how many tuns are in 58746849 gallons of beer. Anſw. 271976 tuns, 33 gallons.

48. In 4872586 kilderkins how many barrels and tuns? Anſwer 406048 tuns, 1 butt, 2 bar.

49. A publican in London computes that he draws every day in the year, one with the other, 54 pints, and 42 quarts or full pots of beer. Can you let me know how many butts he draws in the year, according to the above computation? Anſ. 58 butts, 32 gallons, 2 pints.

50. Another publican propoſes to his ſon the following queſtion, viz. If I draw every day 110 pints, every week 686 full tankards or quarts, and every month 280 full half gallons of beer; I demand how many butts the three different meaſures will amount to in the year. Anſwer 145 butts, 1 hogſhead, 42 gallons, 6 pints.

XV.

CLOTH MEASURE.

51. In 19518568 quarters how many yards? Anſwer 4879642.

52. How many yards are in 13997904 nails? Anſwer 874869.

53. Let me know how many yards are in 939993 nails. Anſwer 58749 yards, 2 qrs, 1 nail.

54. In 1095880 nails how many Engliſh ells? Anſwer 54794.

55. How many ells Flemiſh in 1169837676 nails? Anſ. 97486473.

56. Let me know how many French ells are in 17992458 nails. Anſwer 749685 ells, 4 qrs, 2 nails.

57. How many Engliſh ells are in 47486 yards? Anſ. 37988 ells, 4 qrs.

58. In 8794723 yards how many ells Flemiſh? Anſwer 11726297 ells, 1 qr.

59. I want to know how many French ells are in 579486 yards, 3 qrs. Anſwer 386324 ells, 3 qrs.

60. How many yards are in 49874 Engliſh ells and 4 quarters? Anſwer 62343 yards, 2 qrs.

61. How many yards are in 49758 ells Flemiſh, and 2 quarters? Anſwer 37319.

62. In 97468 French ells, 5 quarters, how many yards? Anſ. 146203 yards, 1 quarter.

63. A linen-draper has a piece of Iriſh linen, containing 20 Engliſh ells, and a piece of holland containing 36 ells Flemiſh. I demand how many yards do both contain together. Anſwer 52.

64. A linen-draper deſires to know how many yards are contained in the 3 following pieces, viz. 50 ells Engliſh, 4 qrs, 3 nails; 92 ells Flemiſh, 2 qrs, 3 nails; and 74 French ells, 5 qrs, 2 nails. Anſ. 245 yards, 3 qrs.

XVI.

LAND MEASURE.

65. In 19914516 roods how many acres? Anſ. 4978629.

66. How many acres are in 37945819 roods? Anſwer 9486454 acres, 3 roods.

67. Let me know how many acres are in 1199782184 rods. Anſwer 7498638 acres, 2 roods, 24 rods.

68. In 7477597191/2 yards how many acres? Anſwer 849726 acres, 3 roods, 32 rods, 31/2 yards.

69. If a piece of land conſiſts of 127151 rods, and another piece of land conſiſts of 509948 yards, I demand how many acres both contain together. Anſ. 1374 acres, 0 roods, 28 rods, 41/2 yards.

XVII.

LONG MEASURE.

70. Let me know how many degrees are in 189753700 leagues. Anſwer 9487685.

71. How many degrees do 1591739495 leagues make? Anſwer 79586974 degrees, 15 leagues.

72. In 3479078279 miles how many degrees? Anſwer 57984637 degrees, 19 leagues, 2 miles.

73. I want to know how many degrees are in 18413070 yards and ½. Anſwer 174 degrees, 7 leagues, 0 miles, 7 furlongs, 31 rods.

74. Suppoſe 22809600 barley-corns would reach from London to Bath, can you let me know how many miles aſunder they are? Anſwer 120 miles.

75. I find that the wheel of a carriage that is 16 feet 10 inches round will turn between London and Edinburgh 94099 times, and 2 inches over: let me know the diſtance in miles. Anſwer 300.

XVIII.

TIME.

76. In 103332567 months how many years? Anſwer 7948659 years.

77. Let me know how many years are in 127893322 months. Anſwer 9837947 years, and 11 months over.

78. How many years are in 3552185 days? Anſwer 9758 years, 9 months and 3 weeks.

79. In 3095075 days how many years? Anſwer 8479 years and 240 days.

80. The age of one Thomas Parr, who lived in the time of King Charles I. when reduced to minutes, I find to make 79672320 minutes; let me know the years of his age. Anſwer 152.

81. John and Tom were born at a birth, John lived 31374389 minutes, Tom lived 952238 hours: I demand which of them lived 109 years, 14 hours, and how much did that exceed the age of the other. Anſ. Tom; and exceeded John 49 years, 1 month, 3 weeks, 3 days, 19 hours, 31 minutes.

XIX.

COMPOUND DIVISION.

1. When I pay 9s. 4d. for 7 pair of gloves, let me know how much it is for one pair. Anſwer 1s. 4d.

2. If I pay 13s. 6d. for 9 pair of ſleeve buttons, how much is it for 1 pair? Anſwer 1s. 6d.
3. What muſt I pay for 1 pair of ſhoe buckles, if for 10 pair I pay 15s. 10d. Anſwer 1s. 7d.
4. What is the price of 1 dozen of oranges, if for 11 dozen I pay 1l. 0s. 2d. Anſwer 1s. 10d.
5. If I pay 1l. 3s. for 12 dozen of lemons, let me know how much it is for 1 dozen. Anſwer 1s. 11d.
6. Let me know the price of 1 yard of linen if I pay 1l. 16s. 8d. for a piece containing 16 yards. Anſwer 2s. 3½d.
7. When I pay 2 guineas for 1½ dozen bottles of wine, let me know what it is a bottle. Anſwer 2s. 4d.
8. A piece of linen containing 20 yards coſt 2l. 14s. 2d. what coſt 1 yard? Anſwer 2s. 8½d.
9. Suppoſe I earn every month, each month 30 days, 5l. 4s. 4½d. I demand what it comes to per day. Anſ. 3s. 5¾d.
10. A chandler paid for 35lb. of coffee 6l. 19s. 3¼d. Now I want to know what it ſtood him in the pound. Anſ. 3s. 11¾d.
11. I bought a parcel of ſilk handkerchiefs containing 3 dozen and 4, for which I paid 9l. 18s. 4d. I want to know what they ſtand me in a-piece. Anſ. 4s. 11½d.
12. 28l. 8s. 9d. make 50 Iriſh half guineas: I demand the ſum of one of them. Anſwer 11s. 4½d.
13. A butcher who bought 55 ſheep at Smithfield this morning, and paid for them 43l. 8s. 6½d. deſires to know what he may ſell them at, ſo as to gain 18d. by each ſheep. Anſwer 17s. 3½d.
14. A farmer in Surry holds a piece of ground containing 60 acres, pays for the whole 59l. 18s. 9d. Can you let me know what he pays an acre? Anſ. 19s. 11¾d.
15. A cheeſemonger pays for 60 large cheeſes 63l. 7s. 6d. Let me know what he may ſell one of them at to gain by it 1s. 10½d. Anſwer 1l. 3s.
16. In Ireland 64 of their guineas make 72l. 16s. can you find out what 1 of them makes? Anſ. 1l. 2s. 9d.
17. A merchant in London received advice from his correſpondent in Corke, that he ſhipt for his account, on board the Lovely Molly, 64 barrels of beef, which ſtands

ſtands him in 79l. 13s. 4d. I want to know what 1 barrel ſtands him in. Anſwer 1l. 4s. 10$\frac{3}{4}$d.

18. A butter factor in London pays for 72 caſks of Iriſh butter 118l. 8s. 6d. Let me know how much 1 caſk comes to at that rate. Anſwer 1l. 12s. 10$\frac{3}{4}$d.

19. A hoſier in London received from his friend in Scotland 88 dozen of knit ſtockings, with advice that they ſtand him in 226l. 17s. 6d. Now let me know how he may ſell them a dozen in London, ſo as to gain by it 8s. 5$\frac{1}{4}$d. Anſwer 3l.

20. A taylor contracted to clothe 100 of his majeſty's ſoldiers at a certain ſum for each man; the amount of his bill was 389l. 7s. 6d. Find me out how much the ſum was. Anſwer 3l. 17s. 10$\frac{1}{2}$d.

21. A grazier received for 110 cows he ſold at Smithfield, 504l. 19s. 4$\frac{1}{2}$d. I want to know at what he ſold them a piece. Anſwer 4l. 11s. 9$\frac{3}{4}$d.

22. A watchmaker exports to America 121 ſilver watches, which he computed will amount there to 784l. 9s. 8d. Let me know how much they are to be ſold for a piece at that computation. Anſwer 6l. 9s. 8d.

23. A nobleman at the time of his death ordered that 784l. 11s. 6d. ſhould be equally divided between 132 poor people in the pariſh where he lived. Can you divide it exactly, and give each perſon his due ſhare? Anſwer 5l. 18s. 10$\frac{1}{2}$d.

24. His majeſty of his royal bounty ordered that 999l. 19s. 11$\frac{3}{4}$d. ſhould be equally divided between 144 poor widows, of the pariſh of St. James's, London. Let me know how much comes to each widow. Anſwer 6l. 18s. 10$\frac{1}{2}$d. and ſomething over.

CHAP. VI.

REDUCTION OF COIN.

Sect. I.

Multiplication and Diviſion are chiefly uſed in the operation of this rule, for things are brought into a ſmaller name or denomination by Multiplication, and into greater by Diviſion. This will more plainly appear by the following examples.

EXAMPLES.

1. In 703l. 17s. 10½d. how many halfpence? Anſwer 337869.
2. How many farthings are in 999l. 19s. 11¾d. Anſwer 959999.
3. Reduce 337869 halfpence into pounds. Anſwer 703l. 17s. 10½d.
4. Bring 959999 farthings into pounds. Anſwer 999l. 19s. 11¾d.

II.

5. How many ſhillings are there in 9746825 crowns? Anſwer 48734125.
6. Reduce 7486942 nine-ſhilling pieces into ſhillings. Anſwer 67382478.
7. Bring 574869 guineas into ſhillings. Anſ. 12072249.
8. In 3947258 moidores how many ſhillings? Anſwer 106575966.
9. How many ſhillings are in 684725 pieces of 36 ſhillings each? Anſwer 24650100.

III.

10. Reduce 748694728 groats into pence. Anſwer 2994778912.
11. How many pence are in 479684 half crowns? Anſwer 14390520.
12. Bring 2794863 quarter guineas into pence. Anſwer 176076369.
13. In 2874864 half guineas how many pence? Anſwer 362232864.
14. Reduce 746847 half moidores into pence. Anſwer 120989214.

IV.

IV.

15. How many farthings are in 8746927 groats? Anſwer 139950832.

4 8746927
4 16
16 52481562
8746927
139950832

16. Reduce 59748 half crowns into farthings. Anſwer 7169760.
17. Bring 49746 guineas into farthings. Anſ. 50143968.
18. In 39472 moidores how many halfpence? Anſwer 25577856.
19. How many halfpence are in 39468 pieces of 36 ſhillings each? Anſwer 34100352.
20. Reduce 749640 quarter guineas into farthings. Anſwer 188909280.
21. How many halfpence are in 35847 half guineas. Anſwer 9033444.
22. Let me know how many farthings are in 297481 Iriſh half guineas of 11s. 4½d each. Anſwer 162424626.

V.

23. Reduce 339890556 pence into groats.

4) 339890556

Anſwer 84972639 groats.

24. In 32837808 pence how many ſixpences? Anſwer 5472968.
25. How many half crowns are in 59245890 pence? Anſwer 1974863.
26. Reduce 53532795 pence into quarter guineas. Anſwer 849726 quarter guineas, and 57 pence over.
27. Bring 122328234 pence into half guineas. Anſwer 970859.
28. In 903350952 pence how many guineas? Anſwer 3584726.

29. Reduce 3421835088 pence into 36-ſhilling pieces. Anſ. 7920914 36-ſhilling pieces, and 20 ſhillings over.

VI.

30. In 781030032 halfpence how many groats? Anſwer 97628754.

4
2
—
8

8) 781030032
97628754

31. How many groats are in 103960608 farthings? Anſwer 6497538 groats.

32. Reduce 200999235 farthings into ſixpences. Anſwer 8374968 ſixpences and 3 qrs.

33. Bring 227688240 halfpence into half crowns. Anſwer 394804.

34. How many Iriſh half crowns, each 2s. 8½d. are in 7732294000 farthings? Anſwer 59479184, and 20 pence over.

VII.

35. Reduce 7498647 groats into ſixpences. Anſwer 4999098.

36. How many half crowns are in 847269420 ſhillings? Anſwer 338907768.

37. In 8572947 crowns how many half guineas. Anſwer 4082355 guineas, and 7s. 6d.

38. Reduce 6847294 quarter guineas into half moidores. Anſwer 2662836 half moi. and 7s. 6d.

39. How many moidores are in 97486495 half guineas? Anſwer 37911414 moi. and 19s. 6d over.

40. In 976486940 mark-lups of 3s. 9¾d. each, how many mill-rees of 6s. 9d. each? Anſwer 551534290 mill-rees, and 1s. 3d. over.

VIII.

41. Reduce 4492550400 groats into pounds. Anſwer 74875840.

4492550400
4

24|0) 1797020160|0 (74875840

42. How many pounds are in 699895536 half crowns? Anſwer 87486942.

43. In 18069118 half guineas and 1 ſhilling over, how many pounds? Anſwer 9486287.

44. Reduce 7498649 quarter guineas, and 2s. 9d. over, into pounds. Anſwer 1968395l. and 10s. over.

45. In 89472658 half moidores, and 6s. 9d. how many pounds? Anſwer 60394044l. and 9s. 9d. over.

46. In Ireland half crowns paſs at 2s. 8½d. each; tell me how many pounds would 59487264 of them make. Anſwer 8055567.

47. Half guineas in Ireland are 11s. 4½d. each; let me know how many pounds are in 987468572 of them, and 7s. 5d. over. Anſwer 561622750l. and 13s. 11d. over.

IX.

48. Reduce 974874 guineas, and 59875 moidores, into pounds. Anſwer 1104327l. and 9s. over.

49. Bring 79486472 crowns, and 8407264 pieces of 36s. each, into pounds. Anſwer 35004693l. and 4s. over.

50. Let me know how many pounds are in 7948374 groats, and 9764826 ſixpences. Anſwer 376593l. and 11s. over.

51. Reduce 472874 quarter guineas, and 5748694 pieces of 9s. each, into pounds. Anſwer 2711041l. and 14s. 6d. over.

52. Let me know how many pounds are in 94728 half crowns, 897462 half guineas, and 84729 half moidores. Anſwer 540200l. and 12s. 6d. over.

53. A merchant has a certain quantity of crowns, which he changes with a caſhier for guineas, and receives of him 7490 guineas: I demand how many crowns the merchant had. Anſwer 31458.

54. A merchant had cobs of 4s. 7½d. and ducatoons of 5s. 10½d. and of each an equal number, for which he received from a caſhier 701 guineas, and 399 moidores; I demand the number he had. Anſwer 2428.

X.

55. A merchant received the following different ſpecies: I demand how many pounds they make, viz.

		s.	d.
872	at	5	3
924	at	4	6
748	at	9	0

£. 773 8 0 Anſwer.

56. Received of Adam Paywell 5406l. 17s. 6d. in full for 698 caſks of butter, and 700 barrels of beef ſold him, viz.

		s.	d.
5041	at	13	6
852	at	10	6
7480	at	2	6
691	at	18	0

£. 5406 17 6 Anſwer.

57. Received of John Dealer 329l. 7s. 0½d. in part payment of 400 caſks of butter ſold him, viz.

		s.	d.
101	at	13	6
74½	at	18	0
200½	at	5	3
84¼	at	27	0
107	at	6	9

£. 337 14 1½ Anſwer.

58. Paid Iſaac Factor 463l. 17s. 2d. in part payment 126 cwt. of ſugar, and 134 hogſheads of rum, bought of him, viz.

		s.	d.
251	at	10	6
501	at	5	3
203	at	2	8½
79	at	11	4½
20½	at	72	0
172	at	2	6
36½	at	18	0

Anſwer. £. 463 17 2

59. Received of Francis Banker, by order, and for account of Samuel Juſtman, viz.

		s.	d.
1201½	at		12
705⅓	at	2	6
1002	at	3	4
539	at	5	0
971½	at	21	0
2042⅓	at	18	0
374½	at	6	9
1400⅓	at	27	0
101½	at	10	6
743	at	5	3

Anſwer. £. 5573 6 8½

60. Paid Benjamin Dunn, in full of all accounts, viz.

		s.	d.
2071	at	2	8½
962	at	11	4½
1036½	at	9	0
7452	at	5	3
3674½	at	13	4
872	at	5	0
3080½	at	2	6
947	at	10	6
4020½	at	36	0
684	at	18	0
9999	at	0	6
8054	at	0	3
7464	at	1	0
1072½	at	5	5
647⅓	at	21	0
872½	at	4	6

Anſwer. £. 16542 17 11

A HOSIER'S BILL.

Bought of Robert Smoothſtockings, 8th March, 1770.

	s.	d.		l.	s.	d.
6 pair of women's mixt worſted hoſe at - - -	3	6	p. pr.	1	1	0
8 pair of women's ſilk hoſe at	9	5	p. pr.	3	15	4
21 pair of men's woollen ditto at	3	1	p. pr.	3	4	9
10 pair of women's ditto at	2	3	p. pr.	1	2	6
20 yards of flannel at -	1	9	p. yd.	1	15	0
9 pair of thread hoſe at -	2	11	p. pr.	1	6	3
				12	4	10

A MER-

A MERCER'S BILL.

London, 9th March, 1770.
Bought of Solomon Newſom, viz.

	s.	d.		l.	s.	d.
12 Yards of rich flowered ſattin at	12	6	per yd.			
10 Yards of ſprigged tabby at	6	7	per yd.			
9 Yards of Farringdon at -	6	11	per yd.			
11 Yards of mohair at -	4	8	per yd.			
21 Yards of luteſtring at -	3	4	per yd.			
15 Yards of Paduaſoy at -	11	8	per yd.			
24 Yards of Poplin at -	3	5	per yd.			
				35	16	5

A LEATHERSELLER'S BILL

Bought of Jacob Hide, 10th March, 1770.

	s.	d.		l.	s.	d.
18 Large oiled lamb-ſkins at	1	5½	per ſkin			
23 Kip of goat-ſkins at	3	6¾	per ſkin			
59 Alumed ſheep-ſkins at	1	4¼	per ſkin			
28 Calf-ſkins at - -	4	9½	per ſkin			
87 Oiled buck-ſkins at -	13	1½	per ſkin			
17 Ruſſia hides at -	12	10¾	per hide			
72 Doe-ſkins at -	11	7½	per ſkin			
15 Dicker of hides at 15	14	11	per dick.			
				362	4	1¼

A FISHMONGER'S BILL.

Bought of Abraham Salmon, 12th March, 1770.

	l.	s.	d.		l.	s.	d.
3 Cwt. of haberdine at	7	10	6	per cwt.			
1½ Cwt. of ling at -	8	14	8	per cwt.			
4½ Cwt. of ſtock fiſh at	4	12	7	per cwt.			
6½ Barrels white herrings at	3	8	3	per bar.			
2 Barrels of red ditto at	2	9	5½	per bar.			
120 Dried ſalmon at	0	1	7½	per ſal.			
42 Kegs of ſturgeon at	0	17	9¾	per keg.			
15 Ditto of ditto at -		ditto		per do.			
132 Dried ſalmon at		1	3½	per ſal.			
					152	10	10¼

BILLS ON BOOK DEBTS.

A WOOLLEN DRAPER'S BILL.

Mr. David Taylor to Francis Frize, Dr.

1770.		s.	d.	l.	s.	d.
March	20, To 18½ yds. of black cloth at -	18	7½ p. yd.			
	24, To 29 ditto of drab-deberry at	15	10½ p. yd.			
April,	2, To 48½ do. mixt grey cloth at	11	4½ p. yd.			
	9, To 37½ do. of ſuperfine blue at	19	11½ p. yd.			
	12, To 57 do. of frize at	3	7¾ p. yd.			
	17, To 20 do. of fine Spaniſh black at	19	10¼ p. yd.			
	20, To 34 do. of livery ſcarlet cloth at	14	8½ p. yd.			
				160	10	0½
Received in part payment of the above bill				72	6	4½
	Balance due			88	3	8

A MERCER'S BILL.

Madam Dinah Gay to Bryan Brocade, Dr.

1770.		s.	d.	l.	s.	d.
April	29, To 18½ yds. of flowered ſattin at	15	8 p. yd.			
May	4, To 23 do. Venetian ſilk at	12	3½ p. yd.			
	12, To 99 do. of mohair at	7	4¾ p. yd.			
	21, To 115½ flowered damaſk at	9	11⅓ p. yd.			
	28, To 7¼ do. velvet at	24	8 p. yd.			
June	1, To 19½ do. luteſtring at	5	2¾ p. yd.			
	8, To 34¼ do. poplin at	3	6 p. yd.			
				142	15	7
Received in part payment of the above bill				9	6	5¾
	Balance due			133	9	1¼

A STATIONER'S BILL.

Mr. Study Scribler to Adam Liber, Dr.

1770.		s.	d.		l.	s.	d.
June 18,	To 119 reams of demy paper at	10	11	p. re.			
27,	To 139 do. of 2 penny foolſcap at	7	1½	p. re.			
	To 147 do. of 2 penny demy at	9	3	p. re.			
30,	To 29 rolls of parchment at	16	10	p. re.			
July 9,	To 12 dozen of copy books at	4	6	p. dz.			
20,	To 101 reams of demy paper at	9	10½	p. re.			
Aug. 3,	To 3 volumes of Swift's Works at	3	6	each			
15,	To 1½ doz. ink-ſtands at	0	7½	each			
					260	10	6

A LINEN DRAPER'S BILL.

Bought of Patrick Ireland, 24th November, 1770.

	s.	d.		l.	s.	d.
42 Ells of dowlas at	1	7½	p. ell			
59 Ditto of Holland at	4	5¾	p. ell			
76 Ditto of diaper at -	1	1½	p. ell			
99 Yards of printed linen at	2	2½	p. yd.			
7½ Dozen damaſk napkins at	2	6¼	each			
105 Yards of cambric at -	11	11$\frac{8}{2}$	p. yd.			
156 Yards of Iriſh linen at	3	9½	p. yd.			
164 Ditto of muſlin at -	7	4¾	p. yd.			
107 Ditto of canvas at -	2	8½	p. yd.			
				210	13	4¼

CHAP. VII.

THE RULE OF THREE DIRECT.

SECT. I.

The Rule of Three teacheth, by three numbers given to find a fourth, which ſhall bear ſuch a proportion to the ſecond as the third doth to the firſt.

RULE.

In ſtating the queſtion, your firſt and third number muſt be of one name, and if they are not ſo, reduce them to it. If the middle number (which always differs in name from the third) has more than one denomination, reduce it to the loweſt mentioned; then multiply your ſecond and third number together, and the product of them divide by your firſt number, the quotient of which will be the anſwer to the queſtion in the ſame name you left your middle number in.

Note 1. The firſt number is always known by the words *if*, or *at*, and the third number is known by the words *how much*, or *what will*.

Note 2. When the firſt number is an unit, or 1, the anſwer is found by multiplication only, when the ſecond or third number is an unit, it will be found by diviſion.

EXAMPLE.

1. If 1 yard of cloth coſt 4s. what would 25 yards coſt? Anſwer 5l.

yd. — *s.* — *yds.*
If 1———4———25
4
2|0) 10|0
Anſ. £. 5

2. If 1 lb. of ſugar coſt 8d. what will 112 lb. come to? Anſwer 3l. 14s. 8d.
3. What will 17 tun come to at 25l. the tun? Anſwer 425l.
4. If one piece of ſilk coſt 27l. how much will 50 pieces coſt? Anſwer 1350l.
5. If one earns 10s. a week, what will it come to in 52 weeks? Anſwer 26l.
6. What will 215 cwt. of madder coſt at the rate of 50s. per cwt.? Anſwer 537l. 10s.
7. At 6s. the gallon of wine, what will 139 gallons come to? Anſwer 41l. 14s.
8. What will 1050 lb. of merchandizes come to at 19d. the lb.? Anſwer 83l. 2s. 6d.
9. If 1 lb. of raiſins coſt 18 farthings, what would 112lb. coſt? Anſwer 2l. 2s.
10. If one ſpends 6d. a day, what will it amount to in one year of 365 days? Anſwer 9l. 2s. 6d.
11. How much will 112 lb. of tea come to at the rate of 5s. the lb.? Anſwer 28l.
12. At 9s. the gallon for brandy, what will a hogſhead come to? Anſwer 28l. 7s.

II.

13. If 1 lb. of coffee coſt 5s. 6d. what would one hundred weight coſt? Anſwer 30l. 16s.

EXAMPLE.

```
      lb.         s.  d.          lb.
   If 1 ———————   5   6 ———————   112
                 12                66
                ———              ————
                 66               672
                                  672
                                 ————
                            12 ) 7390
                                 ————
                            2|0 ) 61|6

                  Anſwer £. 30  16
```

14. How much will 7 tun of butter come to at 37l. 10s. the tun? Anſwer 262l. 10s.
15. At 18s. 6d. the cwt. what will 120 cwt. come to? Anſwer 111l.
16. If 1 yard of cloth coſt 6s. 7d. what will 100 yards coſt? Anſwer 32l. 18s. 4d.
17. What will 112 lb. of ſugar come to at 7½d. per lb.? Anſwer 3l. 10s.
18. If one hundred weight of merchandizes coſt 18s. 8d. how much will 314 cwt. come to? Anſ. 293l. 1s. 4d.
19. At 3¼d. the lb. what will 112 lb. come to? Anſwer 1l. 10s. 4d.

III.

20. If one ounce of ſpice coſt 2s. what will 112 lb. come to? Anſwer 179l. 4s.

EXAMPLE.

```
     lb. oz.    s.     lb.
If    1 ——— 2 ——— 112
                   16
                  ————
                  672
                  112
                  ————
                  1792
                     2
                  ————
             2|0) 358|4
                  ————
   Anſwer £. 179  4
```

21. At 12s. the yard, what will 10 pieces of cloth come to, each piece 42 yards? Anſwer 252l.
22. What will 31 tun of wine come to at 18l. per hogſhead? Anſwer 2232l.
23. If 1 gallon of oil coſt 8s. how much will 10 pipes come to, each pipe 120 gallons? Anſwer 480l.
24. How much will 5 load of oats come to, each load 40 buſhels, at 6d the peck? Anſwer 20l.
25. If 1 gallon of brandy coſt 9s. what will 12 hogſheads come to? Anſwer 340l. 4s.

26. At 9d. the lb. what will 9 caſks of merchandizes come to, each weighing 40lb. Anſwer 13l. 10s.

27. What will 3 caſks of merchandizes come to, each weighing 2 cwt. and at 7d. per lb.? Anſwer 19l. 12s.

IV.

28. If 1 yard of ſtuff coſt 17d. what will 3 pieces and 10 yards come to, each piece 42 yards? Anſwer 9l. 12s. 8d.

EXAMPLE.

```
   yd.        d.         p. yds.
If 1 ——— 17 ——— 3  10
                 42
               ————
                136
                 17
               ————
          12 ) 2312
               ————
         2|0 ) 19|2  8
               ————
     Anſwer £. 9 12  8
```

29. What would 224 lb. 6 oz. of ſpice come to at the rate of 3s. the ounce? Anſwer 538l. 10s.

30. At 7d. the peck of oats, what would 6 loads and 3 pecks come to? Anſwer 28l. 1s. 9d.

31. How much will 12 lb. 10 oz. of ſilver come to at 5s. the ounce? Anſwer 38l. 10s.

32. What will 156 cwt. 2 qrs. of merchandizes come to at the rate of 7d. the lb.? Anſwer 511l. 4s. 8d.

33. If 1 gallon of rum coſt 9s. what will 13 hhds and 34 gallons come to? Anſwer 383l. 17s.

34. What muſt I have for 15 tuns and 6 cwt. of butter at the rate of 46s. per cwt.? Anſwer 703l. 16s.

V.

35. If an ounce of ſpice coſt 3s. 4d. what will 18 lb. 10 oz. coſt? Anſwer 49l. 13s. 4d.

EXAMPLE.

```
     oz.        s.  d.          lb. oz.
If 1 ————————   3   4 ————————  18  10
               12               16
              ————            ————
               40              108
                                19
                             ————
                               298
                                40
                            ————————
                        12 ) 11920
                            ————————
                       2|0 ) 991|3   4
                            ————————
        Anſwer £.           49 13   4
```

36. If 1 lb. of tea coſt 11s. 9d. what will 4 cwt. 3 qrs. come to? Anſwer 312l. 11s.

37. I demand the amount of 50 pieces and 10 yards of cloth at 4s. 9d. the yard, each piece containing 20 yards. Anſwer 239l. 17s. 6d.

38. What will 76 cwt. 0 qrs. 8 lb. of coffee come to at 4s. 10d. the lb.? Anſwer 2059l.

39. If 1 lb. of any thing coſt 1s. 9d. how much will 7 cwt. 2 qrs. 26 lb. come to? Anſwer 75l. 15s. 6d.

40. At 16l. 10s. the hogſhead of wine, what will 25 tun, 3 hogſheads come to? Anſwer 1699l. 10s.

41. What will 150 tanned hides come to, weighing 39 cwt. 3 qrs. 1 lb. at 9$\frac{1}{4}$d. the lb.? Anſwer 171l. 12s. 6$\frac{1}{4}$d.

VI.

42. If 1 tun of wine coſt 84l. what coſt 25 tuns, 2 hhds.? Anſwer 2142l.

EXAMPLE.

```
   tun        l.       tuns hdds.
If 1 ——— 84 ——— 25   2
   4                4
   —               ——
   4              102
                   84
                  ———
                  408
                 816
                 ————
             4 ) 8568
                 ————
```

Anſwer £. 2142

43. At 2l. 2s. the cwt. of cheeſe, what will 12 cwt. 2 qrs. come to? Anſwer 26l. 5s.

44. How much will 17 cwt. 2 qrs. of butter come to at 39s. 11d. per cwt.? Anſwer 34l. 18s. 6½d.

45. If 1s. gains 3d. what will 56s. 8d. gain? Anſwer 14s. 2d.

46. What is the amount of 760 ſtone and 7 pound of wool at 11s. 8d. the ſtone? Anſwer 443l. 12s. 6d.

47. What muſt I pay for 48 tuns, 3 hhds of wine at 88l. the tun? Anſwer 4290l.

48. If in 5 days I ſpend 1l. what will it amount to in a year of 365 days? Anſwer 73l.

49 If 1 tun of tallow coſt 37l. how many tun can I have for 1850l.? Anſwer 50 tuns.

50. How many oranges can I have for 100 crowns at 2 crowns per hundred, each hundred 6 ſcore? Anſwer 6000.

51. If 5 apples coſt 1d. what would 1000 apples coſt? Anſwer 16s. 8d.

52. How many herrings can I have for 5d. if 1000 coſt 83s. 4d.? Anſwer 5.

53. If 1 hundred of butter coſt 50s. how many hundred weight can I have then for 337l. 10s.? Anſ. 135 cwt.

54. At 15s. per cwt. how many cwt. can I have then for 615l. 15s.? Anſwer 821 cwt.

VII.

55. If one peck of barley coſt 13d. how many coombs can I have for 188l. 1s. 4d.? Anſwer 217 coombs.

EXAMPLE.

```
    d.        peck         l.   s.  d.
If 13 ——————— 1 ——————— 188   1   4
                          20
                        ————
                        3761
                          12
                   ——————————4
              13 ) 45136 (3472
                   39    ——————
                  ————   4)868
                    61   ——————
                    52    217 Anſ.
                   ————
                     93
                     91
                    ————
                      26
                      26
```

56. How many lb. of ſpice can I have for 216l. 18s. if one ounce coſt 3s.? Anſwer 90 lb. 6 oz.

57. What quantity of tallow can be bought for 243l. at the rate of 36s. per cwt.? Anſwer 135 cwt.

58. If 1 lb. of pepper coſt 17½d. how many cwt. can I have then for 77l. 8s. 9d.? Anſwer 9 cwt. 1 qr. 26 lb.

59 If 1 tun of butter coſt 37l. how many tuns can I have at that rate for 462l. 10s.? Anſ. 12 tuns, 10 cwt.

60. How much will 159 yards of ſhalloon come to, if for 6 yards I pay 20 ſhillings? Anſwer 26l. 10s.

61. At 75l. the tun of wine, what quantity can I have then for 1181l. 5s.? Anſwer 15 tuns, 3 hhds.

62. If 9 lb. of madder coſt 99d. what will 1 lb. coſt? Anſwer 11d.

VIII.

63. How many cwt. of butter can be bought for 243l. 4s. at the rate of 2l. 16s. per cwt.? Anſwer 86 cwt. 3 qrs. 12 lb.

EXAMPLE.

l. *s.* *cwt.* *l.* *s.*
If 2 16 —— 1 —— 243 4
20 20
cwt. *qrs.* *lb.*
56 56) 4864 (86 3 12 Anſ.
448
384
336
48
4
qrs. *lb.*
56) 192 (3 12
288
24
28
192
48
lb.
56) 672 (12
56
112
112

64. If 1 tun of brandy coſt 112l. 10s. how many tuns can I have then for 2109l. 7s. 6d.? Anſwer 18 tuns, 3 hogſheads.

65. If 1 lb. of any thing coſt 3s. 4d. how many cwt. can I have then for 160l. 15s. 10d.? Anſwer 8 cwt. 2 qrs. 12 lb. 12 oz.

66. At 9s. 4d. the gallon of rum, how many tuns

can I have for 1722l. ? Anſwer 14 tuns, 1 pipe, 36 gallons.

67. How many lb. of ſilver can be bought for 800l. 5s. if for one penny-weight I pay $2\frac{3}{4}$d. ? Anſwer 291 lb.

68. If 1 grain of gold is worth 2d. how many lb. can I have then for 18432l. ? Anſwer 384 lb.

IX.

69. If in 52 weeks I earn 156l. how much is that in one week ? Anſwer 3l.

EXAMPLE.

weeks *l.* *week*
If 52 ——— 156 ——— 1
1

52) 156 (3 Anſw.
156

70. Suppoſe 150 men were provided with 9000 lb. of bread for 2 months ; I demand each man's ſhare. Anſwer 60 lb.

71. If 1 cwt. of butter coſt 56s. what will 1 lb. be worth ? Anſwer 6d.

72. If 101 ſalt ox hides weigh 75 cwt. 3 qrs. what do they weigh one with another ? Anſwer 3 qrs. or 84 lb.

73. What will 1 hhd. of wine come to if 15 hhds. coſt 325l. ? Anſwer 21l. 13s. 4d.

74 At 23s. 4d. per cwt. what is it a lb. ? Anſwer $2\frac{1}{2}$d.

75. What will 1lb. coſt at the rate of 46s. 8d. per cwt.? Anſwer 5d.

76. Suppoſe 305 cheeſes weigh 76 cwt. 1 qr. what do they weigh a piece one with another ? Anſwer 1 qr. or 28 lb.

77. If 1 cwt. coſt 32s. 8d. what is it a lb. ? Anſ. $3\frac{1}{2}$d.

X.

78. If 45 cwt. of merchandizes coſt 60l. 11s. 3d. what is 1 cwt. worth ? Anſwer 1l. 6s. 11d.

EXAMPLE.

```
     cwt.       l.  s.  d.      cwt.
If 75 ——————— 60  11  3 ——————— 1
                20
               ————
               1211
                 12
               ————       12)
         45 ) 14535 ( 323
               135       ————
               ———   2|0) 2|6 11
                103       ————————
                 90  £. 1  6 11  Anſw.
                ———
                135
                135
                ———
```

79. What will a tun of merchandizes ſtand in, if for 13 tuns I pay 241l. 1s. 11d.? Anſwer 18l. 10s. 11d.

80. If 284 lb. of any thing coſt 22l. 3s. 9d. what coſt 1 lb.? Anſwer 1s. $6\frac{3}{4}$d.

81. What will 1 yard of cloth be worth, if for 500 yards I pay 525l. 10s. 5d.? Anſwer 1l. 1s. $0\frac{1}{4}$d.

82. If 369 lb. of ſilver coſt 99l. 11s. $0\frac{3}{4}$d. what is 1 lb. worth? Anſwer 5s. $4\frac{3}{4}$d.

83. What will 1 lb. of beef come to, if for 5690 lb. I pay 88l. 18s. $1\frac{1}{2}$d.? Anſwer $3\frac{3}{4}$d.

84. If 301 fat ſheep coſt 302l. 5s. 1d. what coſt 1 ſheep? Anſwer 1l. 0s. 1d.

XI.

85. If 10 pieces of cloth, every piece 42 yards, coſt 126l. what will 1 yard coſt? Anſwer 6s.

```
   ps.             l.            yd.
If 10 ——————————— 126 —————————— 1
   42              20
  ————           ——————
  420     420 ) 2520 ( 6
                2520
               ——————
```

86. If 575 hundred of herrings, of 6 ſcore to the

hundred, coſt 50 pieces at 23s. each, how many is that for 1s. ? Anſwer 60.

87. A linen-draper received from Ireland 150 pieces of cloth, which ſtand him in 3s. 2½d. the yard, each piece was 25 yards: I demand what all came to at that rate ? Anſwer 601l. 11s. 3d.

88. A merchant imported from America 50 parcels of deer ſkins, which ſtand him in 3250 moidores, each parcel 130 ſkins: I demand how he may ſell them ſo as to gain by each ſkin 18d. ? Anſwer, at 15s.

89. A farmer holds a piece of land, which is divided into 14 cloſes, each containing 16½ acres; 115½ pieces of 36s. each pay his rent in full. Now let me know what he pays an acre. Anſwer 18s.

90. A fiſhmonger had 9 heaps of dried cod, which he valued at 81 guineas, each heap conſiſted of 252 fiſh: let me know what they were a-piece at that rate. Anſwer 9d.

XII.

91. If 6 lb. 6 oz. of avoirdupois weight coſt 4l. 5s. what will 1 oz. coſt ? Anſwer 10d.

```
       lb. oz.        l.  s.         oz.
    If 6   6 ——————— 4   5 ——————— 1
       16            20
       ——            ——
       102           85
                     12
                     ——
           102 ) 1020 ( 10
                 102
                 ———
                   0
```

92. What will 1 hhd. coſt, if for 12 tuns, 3 hhds. I pay 459l. ? Anſwer 9l.

93. If 27 cwt. 2 qrs. of merchandizes coſt 341l. what is 1 qr. worth ? Anſwer 3l. 2s.

94. If 3 pieces and 10 yards of cloth, each piece 42 yards, coſt 115l. 12s. what coſt 1 yard ? Anſ. 17s.

95. What is 1 lb. of butter worth, if for 429 cwt. 0qrs. 21 lb. I pay 1301l. 19s. ? Anſwer 6½d.

96. If 17 tuns, 2 hhds. coſt 896l. 17s. 6d. what is that a hhd. ? Anſwer 12l. 16s. 3d.

97. A merchant bought 2 hhds. of madder, weight 17 cwt. 2 qrs. for 52l. 10s. I demand what 1 cwt. coſt. Anſwer 3l.

98. If 7 tuns, 2 hhds. of brandy coſt 720l. what is 1 tun worth? Anſwer 96l.

99. What will 1 lb. of ſpice coſt, if 7 lb. 8 oz. coſt 4l. 5s.? Anſwer 11s. 4d.

XIII.

100. If 112l. 15s. gain 22l. 11s. what will 1l. gain? Anſwer 4s.

l. *s.* — *l.* *s.* — *l.*
If 112 15 —— 22 11 —— 1
20 — 20 — 20
2255 — 451 — 20
20
2255) 9020 (4
9020

101. What will 1 cwt. of butter come to, if for 33 cwt. 1 qr. 22 lb. I pay 93l. 13s.? Anſwer 2l. 16s.

102. If 67 hogſheads and 9 gallons of brandy coſt me 1903l. 10s. what doth 1 hhd. coſt? Anſwer 28l. 7s.

103. If 203 tun, 9 cwt. 3 qrs. 3 lb. of tallow ſtand me in 9116l. 6s. what is it a tun? Anſwer 44l. 16s.

104. What muſt I pay for 1 tun of cheeſe, if for 234 tuns, 10 cwt. I pay 8754l. 13s. 4d.? Anſ. 37l. 6s. 8d.

XIV.

105. If 5 yards of cloth coſt 35s. what will 3 yards coſt? Anſwer 21s.

yds. — *s.* — *yds.*
If 5 —— 35 —— 3
3
5) 105
21 Anſwer.

106. What quantity of raiſins can I have for 105d. if 7 lb. coſt 35d. ? Anſwer 21 lb.

107. If 7 lb. of ſugar coſt 5s. how many cwt. can I have then for 127l. ? Anſwer 31 cwt. 3 qrs.

108. What quantity of figs can I have for 35d. if for 21 lb. I pay 105d. ? Anſwer 7 lb.

109. If in 365 days I ſpend 18l. 5s. how much is that a week ? Anſwer 7s.

110. If 840 lb. coſt 10l. 10s. what will 35 lb. coſt ? Anſwer 8s. 9d.

111. What will 112 lb. ſtand in, if 7 lb. coſt 1s. 2d. ? Anſwer 18s. 8d.

112. If 112 lb. of currants coſt 2l. 2s. what will 7 lb. come to ? Anſwer 2s. 7½d.

113. What will 25 lb. of any thing come to at the rate of 9l. 6s. 8d. the 100 lb. ? Anſwer 2l. 6s. 8d.

114. How much will 84 lb. of merchandizes come to, if 1 cwt. coſt 1l. 7s. ? Anſwer 1l. 0s. 3d.

XV.

115. How much beef can I have for 200l. if 802 cwt. 1 qr. 17 lb. coſt 1300l. ? Anſ. 123 cwt. 1 qr. 22 lb.

```
     l.           cwt.  qr.  lb.       l.
If 1300 ———————   802    1   17 ——————— 200
                    4
                 ————
                 3209
                   28
              ————————
                25679
                6419
              ————————
                89869
                   200
         ——————————————   28)      4)
 13|00) 179738|00 ( 13826 ( 493
          13               112     ——————————
         ————             ————      123   1  22
          49               262
          39               252
         ————             ————
          107              106
          104               84
         ————             ————
            33              22
            26
           ————
             78
             78
           ————
```

116. If 9 tun of wine coſt 144l. how many tun can I have then for 200l.? Anſwer 12 tuns, 2 hhds.

117. What will 6500 lb. come to, if 5600 lb. coſt 735l.? Anſwer 853l. 2s. 6d.

118. How many tuns can I buy for 2133l. if 12 tuns coſt 1296l.? Anſwer 19 tuns, 3 hhds.

119. If 60 cwt. of hops coſt 320l. what quantity can I have then for 4601l.? Anſwer 862 cwt. 2 qrs. 21 lb.

120. If 3 hhds. of brandy coſt 68l. 17s. what will 7 gallons be worth? Anſwer 2l. 11s.

121. A merchant bought 14 caſks of indigo, weighing 8 cwt. for 313l. 12s. I demand what 7 lb. is worth at that rate. Anſwer 2l. 9s.

XVI

XVI.

122. If 10 cwt. of merchandizes coſt 320 quarter guineas, what will 14 lb. come to? Anſwer 1l. 1s.

```
   cwt.            q. guin.          lb.
 If 10 cwt. ——————— 320 ——————————— 14
   112               63
  ————             ————
   1120              960
                    1920
                  ——————
                   20160
                      14
                 ———————
                   80640
                  20160
                 ————————      12)
       112|0 ) 28224|0 ( 252
                 224          ————
                ————       2|0)2|1
                  582         ————
                  560      £. 1  1
                 ————
                  224
                  224
                 ————
```

123. What will 4 yards of cloth coſt, if 19 pieces, each piece 35 yards, coſt 280 cobs, each at 4s. 9d.? Anſwer 8s.

124. If 2 pipes of oil coſt 82l. 10s. each pipe 120 gallons, what will one jar containing 20 gallons coſt? Anſwer 6l. 17s. 6d.

125. What will a quarter of a hundred of coffee come to, if 3 bales, containing 10 cwt. coſt 252l.? Anſ. 6l. 6s.

126. If for 2s. 7½d. I can buy 7 lb. of raiſins, what quantity can I have then for 1059l. 14s. 3d.? Anſwer 504 cwt. 2 qrs. 14 lb.

127. If 10s. 6d. gain 3d. what will 198 guineas and 15s. 9d. gain? Anſwer 4l. 19s. 4½d.

128. How many tuns of merchandizes can I have for 900

900l. 8s. 5¼d. if 7 tuns coſt 285l.? Anſwer 22 tuns, 2 cwt. 1 qr. 7 lb.

129. If for 32s. 8d. I buy 28lb. of galls, what quantity can I have then for 88l. 13s. 4d.? Anſwer 13 cwt. 2 qrs. 8 lb.

130. What will 343l. 14s. 8d. gain, if 2l. 13s. 8½ gain 16s.? Anſwer 102l. 8s.

XVII.

131. When I pay 4l. 4s. for 1 cwt. 2 qrs. of butter, how much muſt I pay for 352 cwt. 1 qr. 22 lb. at that rate? Anſwer 986l. 17s.

```
    cwt. qrs.      l. s.       cwt. qr. lb.
If  1    2 —————— 4  4 —————— 352  1  22
    4             20             4
  ————           ————        ————————
    6             84          1409
   28                           28
  ————                       ————————
  168                        11274
                             2820
                          ——————————
                             39474
                                84
                          ——————————
                            157896
                           315792
                         ———————————— 2|0
                168 ) 3315816 ( 1973|7
                      168      ——————————
                     ————     £. 986 17
                      1635
                      1512
                     ————
                       1238
                       1176
                       ————
                         621
                         504
                        ————
                         1176
                         1176
```

132. If for 607l. 10s. I buy 69 cwt. 0 qrs. 21 lb. of merchandizes, what quantity can I have then for 192 guineas and 18s.? Anſwer 23 cwt. 0 qrs. 7 lb.

133. If for 192 guineas and 18s. I can buy 23 cwt. 0 qrs. 7 lb. of merchandizes, what quantity can I have then for 607l. 10s.? Anſwer 69 cwt. 0 qrs. 21 lb.

134. What will 112 cwt. 3 qrs. 23 lb. of any thing come to, if 95 cwt. 0 qrs. 20 lb. coſt 88l. 16s. 8d.? Anſwer 105l. 8s. 6d.

135. If 1 qr. 14 lb. of merchandizes coſt 2l. 15s. 9d. what will 50 cwt. 3 qrs. 24 lb. come to? Anſwer 378l. 16s. 8$\frac{2}{7}$d.

136. If 100 lb. of tea coſt 25l. 6s. 3d. what will 625 lb. coſt? Anſwer 158l. 4s. 0$\frac{3}{4}$d.

137. What will 95 cwt. 0 qrs. 20 lb. coſt, if 112 cwt. 3 qrs. 23 lb. coſt 105l. 8s. 6d.? Anſwer 88l. 16s. 8d.

XVIII.

138. If 1 lb. of ſpice coſt 10s. 8d. what is $\frac{1}{2}$ an ounce worth? Anſwer 4d.

```
      lb.                s.  d.           oz.
   If 1 ————————————— 10  8 ——————————— ½
      16                12
     ———               ———
      16         32 ) 128 ( 4
       2               128
     ———               ———
      32
```

139. What will 1 lb. of ſpice come to, if $\frac{1}{2}$ an ounce coſt 4d? Anſwer 10s. 8d.

140. If for 10s. 8d. I have 1 lb. of ſpice, what quantity can I have then for 4d.? Anſwer $\frac{1}{2}$ an oz.

141. If for 26$\frac{1}{4}$d. I have 10$\frac{1}{2}$ oz. what quantity can I have then for 8s. 4d.? Anſwer 2 lb. 8 oz.

142. If for 8s. 4d. I have 2 lb. 8 oz. what quantity can I have then for 26$\frac{1}{4}$d.? Anſwer 10$\frac{1}{2}$ oz.

143. What will 10$\frac{1}{2}$ oz. coſt, if 2 lb. 8 oz. coſt 8s. 4d.? Anſwer 26$\frac{1}{4}$d.

144. At 18s. 8d. the cwt. what will $\frac{3}{4}$ of a lb. come to? Anſwer 1$\frac{1}{2}$d.

145. If 1 cwt. coſt 9s. 4d. what will ½ a lb. coſt? Anſwer ½d.

XIX.

146. Bought 3 hogſheads of brandy, quantity 61, 62, and 62½ gallons, at 8s. 9d. per gallon; I demand how much it comes to? Anſwer 81l. 3s. 1½d

```
                                        61
                                        62
                                        62½
    gal.          s.  d.              ———————
If   1  ————————  8   9  ———————————  185½
     2           12                   ———————
   ————        ——————                 371
     2          105                   105
                                     ————————
                                      1855
                                     3710
                                    ——————————
                                 2 ) 38955
                                   ——————————
                                12 ) 19477½
                                   ——————————
                                20 ) 162|3  1½
                                   ——————————
                                 £. 81  3  1½
```

147. How much will 4 pieces of drugget come to, N° 1, quantity 40¼ yards. N° 2, 49½ yards, N° 3, 47 yards, and N° 4, 45¼ yards, at 3s. 4d. the yard? Anſwer 30l. 6s. 8d.

148. Bought 4 parcels of cheeſes, the firſt weighed 10 cwt. 3 qrs. 27 lb. the ſecond, 13 cwt. 0 qrs. 1 lb. the third, 23 cwt. 2 qrs. the fourth, 19 cwt. 3 qrs. 14 lb. and at 1l. 13s. 4d. the cwt. what does it come to? Anſwer 112l. 5s. 10d.

149. Sold 4 hogſheads of tobacco, N° 1 weighed 5 cwt. 2 qrs. N° 2, 5 cwt. 1 qr. 14 lb. N° 3, 5 cwt. 0 qrs. 7 lb. N° 4, 5 cwt. 1 qr. 21 lb. at 10½d. per lb. I demand what it amounts to. Anſwer 104l. 14s. 9d.

150. With how many guineas could I pay for 4 hogſ-

heads of brandy, quantity 62½ gallons, 63, 62¾, and 62½, at the rate of 9s. the gallon? Anſ. 107 guineas, 9s. 9d.

151. Bought 3 hogſheads of ſugar, N° 1 weighed 7 cwt. 2 qrs. 11 lb. N° 2, 8 cwt. 1 qr. 10 lb N° 3, 9 cwt. 1 qr. 8 lb. at 37s. 4d. per cwt. I demand how much it came to, and what it was a lb.? Anſwer 47l. 3s. and at 4d. a lb.

XX.

152. Suppoſe a bale of merchandizes weighed 300 lb. and coſt 15l. 4s. 9d. paid for duty 2d. per lb. for freight 25s. for porterage home 1s. 6d. how much does 1 lb. of the ſaid merchandizes ſtand in? Anſ. 15¼d.

	l.	*s.*	*d.*	
Firſt coſt	15	4	9	
Duty -	2	10	0	
Freight	1	5	0	
Porterage	0	1	6	
lb.				*lb.*
If 300 ——	19	1	3 ——	1

```
          20
         ----
         381
          12
         ----
300 ) 4575 ( 15¼d.
      300
      ----
      1575
      1500
      ----
        75
         4
      ----
300 ) 300 ( ¼
      300
      ----
```

153. Bought 100 raw hides, weight 98 cwt. 2 qrs. at 23s. per cwt. paid for ſalt 2l. 17s. 8d. for ſalting them,

&c.

&c. 8s. 6$\frac{1}{4}$d. for cellarage 1l. I demand the whole coſt, and what one cwt. ſtands in. Anſwer, the whole coſt is 117l. 11s. 8$\frac{1}{4}$d. and at 1l. 3s. 10$\frac{1}{2}$d. the cwt.

154. Bought 100 carcaſes of beef, weight neat 850 cwt. 2 qrs. at 32s. 8d. per cwt. and ſalted them up in 400 barrels, which coſt 3s. 6d. per barrel; paid for 50 barrels of ſalt 20s. per barrel; paid for ſalting, labourers, &c. 8l. 0s. 2d. Now I want to know what one barrel ſtands me in. Anſwer 3l. 15s. 10$\frac{59}{200}$d.

155. Shipt off 350 caſks of butter, weight 546 cwt. 2 qrs. 14 lb. coſt 2l. 5s. per cwt. paid for duty 6d. per cwt. cooperage 2l. 16s. 0$\frac{1}{2}$d. boat-hire 18s. porterage, &c. 2l. 3s. 7d. cellarage 3l. 4s. 7d. I demand what one hundred of the ſaid butter ſtands me in on board. Anſ. 2l. 5s. 10d.

XXI.

156. Bought three ſorts of brandy, and an equal quantity of each ſort, one ſort at 8s. per gallon, the ſecond ſort at 8s. 6d. and the third at 9s. per gallon; what is one gallon worth, one with another? Anſwer 8s. 6d.

```
      gal.        s.  d.
       1 ———————— 8
       1 ———————— 8   6
       1 ———————— 9
      ——        ————          gall.
If     3 ——————— 25   6 ——————— 1
                 12
               ————
             3)306
               ————
            12)102
              —————
                8   6
```

157. Bought three ſorts of vinegar, and of each ſort an equal quantity, viz. at 4$\frac{1}{2}$d. 6d. and 7$\frac{1}{2}$d. the quart, and mixed them together; what doth one quart ſtand me in? Anſwer 6d.

158. Bought four ſorts of ſalt, and of each 100 barrels, viz. of 14s. 16s. 17s. and 19s. the barrel, and mixed them together; what did one barrel coſt me? Anſwer 16s. 6d.

159. Paid for 4 tuns of tallow 120l. more for 5 tuns 150l. 5s. for 6 tuns 192l. 10s.; what doth one tun ſtand me in, one with another? Anſwer 30l. 17s.

160. Bought 102 quarters of wheat for 248l. 16s. more 140 quarters for 280l. and 260 quarters for 575l. 12s. I mixed all together: let me know what 1 quarter ſtands me in. Anſwer 2l. 4s.

161. A merchant bought three ſorts of tobacco, viz. 100 lb. at 6d. per lb. 120 lb. at 10d. per lb. and 200 lb. at 12d. per lb. which he mixed together: now tell me how much one lb. ſtands him in. Anſwer 10d.

XXII.

162. A caſhier has in divers ſpecie 696l. 12s. for which he would have quarter guineas and quarter moidores, but of each ſort an equal number; how many of each muſt he receive? Anſwer 1161.

```
     s. d.
     5  3
     6  9
    ------      of each       l.    s.
If  12  0 ———— 1 ———————— 696   12
                           20
                     ------------
                     12)13932
                     ------------
                        1161
```

163. How many reams of paper of 9s. 9d. and 12s. 3d. the ream, can I have of each ſort for 55l.? Anſ. 50l.

164. How many guineas and half moidores, of each an equal number, can I have for 9988 quarter guineas, and 3s. over? Anſwer 1520.

165. How do you prove the above anſwer to be right?

166. A vintner paid 291l. for three ſorts of wine, viz. at 18l. at 16l. and at 14l. 10s. the hhd. and had of each ſort an equal quantity; I demand how many hogſheads of each ſort he had. Anſwer 6.

167. Bought three ſorts of ſalt, and of each ſort an equal quantity, the price at 14s. 16s. and 19s. the barrel; and the whole amounted to 490l. how many barrels had I? Anſwer 200.

XXIII.

168. A merchant having bought certain merchandizes for 1450l. with condition to deduct 1 per cent. for prompt payment; I demand how much he is to pay. Anſwer 1435l. 10s.

	l.	*l.*	*l.*	*l.*	*s.*	*d.*
If	100———	1 ———	1450	1450	0	0
			1	14	10	0
			14|50	1435	10	0
			20			
			10|00			

169. How much muſt I pay of 1655l. deducting 1 per cent. for prompt payment? Anſwer 1638l. 9s.

170. How much muſt I pay of 912l. 10s. deducting 1 per cent.? Anſwer 903l. 7s. 6d.

171. How much is 1364l. 17s. 6d. deducting 1 per cent.? Anſwer 1351l. 4s. 6d. near enough for merchants buſineſs, though in truth it is 1351l. 4s. $6\frac{3}{10}$d.

172. How much is 6050l. deducting $\frac{1}{2}$ per cent.? Anſ. 6019l. 15s.

173. How much muſt be paid inſtead of 815l. 12s. deducting for ſome reaſon $1\frac{1}{2}$ per cent.? Anſ. 803l. 7s. 3d. and ſomething over.

174. What is 1537l. 17s. 8d. deducting $\frac{1}{2}$ per cent.? Anſ. 1530l. 3s. $10\frac{27}{50}$d.

175. And how much muſt I pay of 1096l. 19s. 6d. deducting $\frac{1}{4}$ per cent.? Anſ. 1094l. 4s. $7\frac{163}{200}$d.

XXIV.

176. A captain of a ſhip being provided with 24000 lb. of bread for 200 ſeamen, of which each man eats 4 lb. per week; how long will the ſaid bread laſt? Anſ. 30 weeks.

```
    200
      4
    ———        week          lb.
If  800 ——————  1  ——————  24000
                               1
                          ——————
                   8|00)240|00
                         —————
                           30
```

177. How long would 3150 lb. of beef laſt for 25 men, if they get $\frac{3}{4}$ lb. each, and that 3 times a week? Anſ. 56 weeks.

178. A fortreſs being provided with 184000 lb. of proviſion, and 700 men, who conſume each 5lb. per week; how long can they ſubſiſt? Anſ. 52 weeks and 4 days.

179. Suppoſe 150 ſeamen are provided with 984 gallons and 3 pints of brandy, for 7 months, each month 30 days; what is one man's ſhare per day? Anſ. $\frac{1}{4}$ of a pint, or a gill.

180. How many tiles of 8 inches ſquare would lay a floor of 16 feet broad and 20 feet long? Anſ. 720.

181. How many yards of cloth, of 2 feet broad, will hang a wall of 24 feet broad and 20 feet high? Anſ. 80.

182. A piece of land of 80 rods long, and 70 rods broad, is to be laid out in cloſes of 20 rods long, and 14 rods broad: I demand how many ſuch cloſes it would make. Anſwer 20.

183. How many tiles of $\frac{3}{4}$ foot ſquare would lay a floor of 50 feet long, and 20 feet broad? Anſwer $1777\frac{7}{9}$.

184. How many ſtones of 10 inches long, 9 inches broad, and 4 inches thick, would be wanting to build a wall of 80 feet long, 20 feet high, and $2\frac{1}{4}$ feet thick? Anſ. 17280.

185. Suppoſe 100 cwt. 2 qrs. 14lb. of beef for ſhips uſe was to be cut into pieces of 4 lb. 3 lb. 2 lb. 1 lb. and $\frac{1}{2}$ a lb. and of each ſort an equal number; how many pieces of each would it make? Anſwer 1073 and $3\frac{1}{2}$ lb. over.

XXV.

186. If one lb. of pepper coſt 13d. and 1 lb. of ſugar coſt 14d. how much of each then can I have for 4l. 1s.? Anſ. 36 lb.

```
        d.
        13
        14
        ——     lb. of each     l.  s.
    If  27 ———— 1 ————— 4   1
                          20
                          ——
                          81
                          12
                          ——
                     27)972(36
                          81
                          ——
                          162
                          162
                          ——
```

187. A. ſets out of a certain town, and goes 9 miles a day; 7 days after, B. ſets out and goes 12 miles a day: I demand in how many days B. will overtake A. Anſ. 21 days.

188. Suppoſe a greyhound makes 27 ſprings whilſt a hare makes 25, and the ſprings are alike. Now, if the hare is 50 ſprings before the hound, I would know in how many ſprings the hound would overtake her. Anſ. 675.

189. If a tun of butter coſt 52l. 10s. I demand at what rate I muſt ſell it, to gain by 15 tuns as much as 1 tun coſt. Anſwer 56l.

190. Bought 45 quarters of wheat, at 42s. per quarter, among which are 16 quarters, whereof 4 are worth but 3 of the reſt; I demand how much muſt I pay. Anſ. 86l. 2s.

191. In a beſieged fortreſs are 5000 men, provided with ſo much bread that each man may have 12 ounces per day. Now if 1000 more are ſent among them, I would know how many ounces each man may have per day. Anſ. 10.

192. Two travellers ſet out at the ſame time, and from the ſame place, the one goes eaſt 24 miles a day, and the other goes weſt 30 miles a day; in how many days (counting each day 24 hours) will they be 2150 miles aſunder? Anſ. 39 days, 19 hours, $33\frac{1}{3}$ minutes.

193. How many guineas and half moidores, of each an equal quantity, can I have for 189l. 15s.? Anſ. 110.

194. If a lb. of ſugar coſt 10d. and is ſold for $13\frac{1}{2}$d. I demand the gain per cent. Anſ. 35 per cent.

195 How many guineas would pay for 10 pieces of tapeſtry, each piece $25\frac{1}{2}$ yards long and 4 yards broad, at 15s. 8d. the ſquare yard? Anſ. 760 guineas, and 20s. over.

196. If 112 lb. of tea coſt 84l. 13s. 4d. at what rate muſt it be ſold a lb. to loſe by the whole parcel 10l.? Anſ. 13s. 4d.

197. If I ſell goods for $13\frac{1}{2}$d. the lb. I find I have gained 35 per cent.; I demand what the goods were bought for. Anſ. 10d.

198. A gentleman has 577l. 19s. 7d. per annum, I demand how much he may ſpend per day, if he has a mind to lay up yearly 100 guineas? Anſ. 1l. 5s. 11d.

XXVI.

199. For 40s. I bought three ſorts of wine; the firſt for 16d. the ſecond for 2s. and the third for 2s. 8d. the quart, and I had of each ſort an equal quantity; I demand how much it was. Anſ. $6\frac{2}{3}$.

16
24
32

of each d.
If 72 —— 1 —— 480
1

72)480($6\frac{2}{3}$
432

$24\left\{\frac{48}{72}\right|\frac{2}{3}$

200. A. travels 12 miles a day, and when he has been gone 15 days, B. ſets out after him; I demand how many miles a day he muſt go to overtake A. in 60 days. Anſ. 15 miles.

201. If in 4 months I ſpend as much as I gain in 3 months, how much can I lay up at the year's end, if I gain every 6 months 150l.? Anſ. 75l.

202. If 840 eggs are bought at the rate of 10 a groat, and 240 more at the rate of 8 a groat, and are all ſold at 18 for 8d. I demand whether profit or loſs? Anſ. 24d. profit.

203. If a piece of cloth 30 yards long coſt 15l. how much will a Dutch ell come to if 3 yards are equal to 4 ells? Anſ. 7s. 6d.

204. If 2 lb. of pepper coſt 25d. what will 60 lb. of cloves come to, if 3 lb. of cloves are worth 16 lb. of pepper? Anſ. 16l. 13s. 4d.

205. How many dozen of gloves at 16d. the pair will pay for 73 dozen and 4 pair of ſtockings, at 3s. 6d. the pair? Anſ. $192\frac{1}{2}$ doz.

206. How much would a piece of plank come to of $5\frac{1}{4}$ feet long, $2\frac{1}{2}$ feet broad at one end, and $1\frac{1}{2}$ foot broad at the other end, at 18d. the ſquare foot? Anſ. 15s. 9d.

207. Bought 9 parcels of goods, each weighing 300 lb. for which I paid 150 guineas and 100 moidores; I demand how I may ſell the goods, ſo as to gain by each lb. 4d. Anſ. 2s. 6d.

208. I bought a parcel of cloth at the rate of 6s. for every 2 yards; of which I ſold a certain quantity at the rate of 18s. for every 5 yards, and I found I had gained as much as 18 yards coſt; I demand how many yards I ſold. Anſ. 90 yards.

CHAP.

CHAP. VIII.

NOTATION AND NUMERATION OF FRACTIONS.

SECT. I.

A **FRACTION**, or broken number, is a part or parts of an integer; it conſiſts of parts or numbers ſet one over the other, with a line drawn between them, as $\frac{1}{2}$ $\frac{3}{4}$ $\frac{2}{3}$ $\frac{7}{8}$ $\frac{9}{10}$, &c.

That below the line is called the denominator, becauſe it denominates or ſhews the parts any whole number is divided into; and the number above the line is called the numerator, becauſe it numbers or tells how many of thoſe parts the fraction conſiſts of.

When the numerator is leſs than the denominator, the fraction is leſs than unity, and then it is called a proper fraction, as $\frac{4}{5}$, $\frac{7}{8}$, $\frac{9}{10}$, $\frac{11}{12}$, &c.

When the numerator is equal to, or greater than, the denominator, it is called an improper fraction, as $\frac{4}{4}$ is equal to 1, or $\frac{4}{3}$ is equal to $1\frac{1}{3}$.

Compound fractions, or fraction of fractions, are ſuch as conſiſt of more than one numerator, and one denominator, and are always connected by the word *of*, as $\frac{1}{3}$ of $\frac{3}{4}$, $\frac{1}{2}$ of $\frac{9}{10}$, &c.

A mixed number is ſuch as conſiſts of a whole number and a fraction joined to it, as $5\frac{1}{2}$, $4\frac{1}{3}$, $3\frac{1}{4}$, $7\frac{5}{8}$, &c.

II.

ABBREVIATION OF FRACTIONS.

To abbreviate or reduce a fraction to its loweſt term, you muſt find the greateſt common diviſor, that will divide both the numerator and denominator without leaving any remainder, then the quotient will be a new fraction of the ſame value, and in its loweſt name or term.

RULE.

Divide the denominator by the numerator, and then divide that numerator by the remainder, and again divide the diviſor by what remains, and ſo continue till nothing remains, then that diviſor that leaves no remainder will be the greateſt common diviſor ſought, as ſuppoſe, if $\frac{91}{117}$ was to be reduced, you'll find it to be equal to $\frac{7}{9}$ thus:

```
91 ) 117 ( 1          Common Diviſor 13 91/117|=7/9
     91
    ----
    26 ) 91 ( 3
         78
        ----
        13 ) 26 ( 2
             26
            ----
```

Abbreviate or reduce the following fractions to their loweſt name or leaſt term.

$\frac{12}{16}$ is equal to $\frac{3}{4}$ $\qquad$ $\frac{4}{48}$ is equal to $\frac{1}{12}$

$\frac{5}{25} = \frac{1}{5}$ $\qquad$ $\frac{9}{36} = \frac{1}{4}$

$\frac{24}{34} = \frac{12}{17}$ $\qquad$ $\frac{16}{64} = \frac{1}{4}$

$\frac{45}{54} = \frac{5}{6}$ $\qquad$ $\frac{114}{285} = \frac{2}{5}$

$\frac{144}{216} = \frac{2}{3}$ $\qquad$ $\frac{2618}{8231} = \frac{11}{19}$

Abbreviate or reduce $\frac{59}{233}$ to its loweſt name. Anſwer, there is no lower, as appears by the following work.

59) 233 (3
177

56) 59 (1
56

3) 56 (18
3

26
24

2) 3 (1
2

1) 2 (2
2

CHAP. IX.

ADDITION OF FRACTIONS.

SECT. I.

Of ſimple fractions which have one common denominator.

RULE I. Add their numerators together, and place their ſum over one of the given denominators.

EXAMPLE.

Add $\frac{2}{5}$ to $\frac{1}{5}$. Anſwer $\frac{4}{5}$.

THUS,

$$\begin{array}{c} \frac{2}{5} \\ \frac{1}{5} \\ \hline \end{array}$$

Anſwer $\frac{4}{5}$

Add the following fractions together.

$\frac{2}{7}$ and $\frac{4}{7}$	the ſum is	$\frac{6}{7}$	$\frac{7}{24}$, $\frac{11}{24}$, and $\frac{13}{24}$ ſum is	$1\frac{7}{24}$
$\frac{2}{9}$ and $\frac{4}{9}$	———	$\frac{2}{3}$	$\frac{11}{20}$, $\frac{7}{20}$, and $\frac{9}{20}$	$1\frac{7}{20}$
$\frac{3}{10}$ and $\frac{1}{10}$	———	$\frac{2}{5}$	$\frac{1}{14}$, $\frac{11}{14}$, and $\frac{9}{14}$	$1\frac{1}{2}$
$\frac{5}{12}$ and $\frac{1}{12}$	———	$\frac{1}{2}$	$\frac{15}{16}$, $\frac{13}{16}$, $\frac{11}{16}$, and $\frac{7}{16}$	$2\frac{7}{8}$

II.

Of mixed numbers with one common denominator.

RULE II. By rule the firſt, add the fractional parts together, and the integers as in whole numbers.

EXAMPLE.

Add $17\frac{3}{5}$ to $12\frac{1}{5}$. Anſwer $29\frac{4}{5}$.

The work.

$$\begin{array}{r} 17\frac{3}{5} \\ 12\frac{1}{5} \\ \hline \text{Sum}\quad 29\frac{4}{5} \end{array}$$

Sums to be added, viz.

$13\frac{1}{15}$, $9\frac{4}{15}$, $3\frac{7}{15}$, and 5, the ſum is	$30\frac{4}{5}$
$1\frac{1}{12}$, $2\frac{5}{12}$, $3\frac{7}{12}$ and $4\frac{11}{12}$	12
$9\frac{13}{14}$, $7\frac{9}{14}$, $5\frac{5}{14}$, 16, 8 and $\frac{11}{14}$	$47\frac{5}{7}$

III.

To add fractions which have no common denominator.

This may be done two ways, viz.

RULE III. Multiply all the denominators together, and the product will be a common denominator, by which divide each particular denominator, whoſe quotient multiply by its numerator, and thoſe products added together, is a new numerator to the common denominator, and total ſum required.

EXAMPLE.

Add $\frac{3}{8}$, $\frac{5}{9}$ and $\frac{7}{12}$ together.

8 Common denominator 864

9 Divided by 8, that multiplied by 3, prod. 324

— Divided by 9, that multiplied by 5, prod. 480

72 Divided by 12, that multiplied by 7, prod. 504

12

—

864) 1308

864

equal to $1\frac{37}{72}$

But it is beſt to find the leaſt common denominator;

THUS,

Rule IV. If there are two or more of the given denominators that can be divided by any one number, divide them, and if their quotients are capable of being divided by any one number or in themſelves, divide them, and ſo continue till you can divide no more; then multiply the laſt quotients by one another, and their product multiply by the diviſor or diviſors, and then you have the leaſt common denominator required.

EXAMPLE II.

As before, let $\frac{3}{8}$, $\frac{5}{9}$ and $\frac{7}{12}$ be added together;

THUS,

Common denominator 72.

8 in 72 and 3 times is 27

9 — and 5 — 40

12 — and 7 — 42

$3)\frac{3}{8}$, $\frac{5}{9}$, $\frac{7}{12}$

4)8 3 4 72) 109

2 3 1 Anſwer $1\frac{37}{72}$

Add the following fractions together, viz.

$\frac{5}{6}$ and $\frac{2}{3}$ the ſum is $1\frac{1}{2}$	$\frac{1}{3}$, $\frac{1}{5}$, $\frac{1}{6}$, $\frac{1}{7}$ & $\frac{1}{8}$ Anſ. $\frac{271}{280}$
$\frac{3}{4}$ and $\frac{11}{12}$ ——— $1\frac{2}{3}$	$\frac{4}{5}$, $\frac{5}{6}$, $\frac{6}{7}$, $\frac{3}{8}$ & $\frac{8}{11}$ — $3\frac{5477}{9240}$
$\frac{1}{8}$ and $\frac{5}{6}$ ——— $\frac{23}{24}$	$\frac{1}{5}$, $\frac{7}{18}$, $\frac{7}{72}$, and $\frac{5}{44}$ — $\frac{6719}{7920}$
$\frac{3}{4}$, $\frac{5}{6}$ and $\frac{7}{8}$ ——— $2\frac{11}{24}$	$\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{13}$, and $\frac{11}{75}$ — $\frac{1049}{1300}$

IV.

The uſe.

1. A merchant bought 5 pieces of cloth, the firſt $40\frac{3}{4}$ yards long; the ſecond $38\frac{1}{2}$ yards; the third $40\frac{3}{8}$ yards; the fourth $41\frac{1}{16}$ yards, and the fifth $42\frac{1}{4}$ yards: I demand how many yards there were in all. Anſwer $202\frac{15}{16}$ yards.
2. Another merchant ſold 4 bales of ſpice, No. 1, weight $150\frac{1}{2}$ lb. No. 2, weight $139\frac{3}{4}$ lb. No. 3, weight $162\frac{2}{3}$ lb. No. 4, weight $170\frac{1}{8}$ lb. I demand how many lb. they weighed together. Anſ. $623\frac{1}{24}$ lb.
3. A grocer ſold the following parcels of ſugar, viz. $16\frac{1}{2}$ lb. $19\frac{1}{4}$ lb. $13\frac{3}{4}$ lb. $20\frac{1}{8}$ lb. $25\frac{1}{16}$ lb. $30\frac{5}{6}$ lb. $11\frac{1}{4}$ lb. I demand how many lb. he ſold in all. Anſ. $136\frac{37}{48}$ lb.

CHAP. X.

MULTIPLICATION OF FRACTIONS.

SECT. I.

To multiply a ſimple fraction by a ſimple fraction.

RULE I. Multiply the numerators together for a new numerator, and the denominators together for a new denominator, and it is done.

EXAMPLE.

$\frac{3}{4}$ multiplied by $\frac{5}{8}$ produces $\frac{15}{32}$.

Thus

$$\frac{3}{4} \text{ — times — } \frac{5}{8} \text{ — is — } \frac{15}{32}$$

Multiply the following fractions, viz.

$\frac{7}{12}$ by $\frac{5}{6}$	product	$\frac{35}{72}$		$\frac{14}{15}$ by $\frac{5}{8}$	product	$\frac{7}{12}$
$\frac{1}{4}$ by $\frac{2}{3}$	——	$\frac{1}{6}$		$\frac{128}{135}$ by $\frac{5}{12}$	——	$\frac{32}{81}$
$\frac{5}{8}$ by $\frac{4}{5}$	——	$\frac{1}{2}$		$\frac{13}{14}$ by $\frac{74}{75}$	——	$\frac{481}{525}$
$\frac{1}{4}$ by $\frac{1}{2}$	——	$\frac{1}{8}$		$\frac{314}{453}$ by $\frac{177}{316}$	——	$\frac{9263}{23858}$

II.

To multiply whole numbers by a ſimple fraction.

Rule II. Make the integer like a fraction by placing 1 under it, and then proceed as before.

EXAMPLE.

How much is 3 times $\frac{1}{4}$?

$$\frac{3}{1} \text{ —— } \frac{1}{4} \text{ is } \frac{3}{4}$$

Sums to be multiplied.

5 by $\frac{1}{8}$	the product is	$\frac{5}{8}$	7 by $\frac{3}{4}$	the product is	$5\frac{1}{4}$
18 by $\frac{2}{9}$	——	4	16 by $\frac{5}{6}$	——	$13\frac{1}{3}$
48 by $\frac{5}{12}$	——	20	34 by $\frac{15}{16}$	——	$31\frac{7}{8}$
8 by $\frac{2}{3}$	——	$5\frac{1}{3}$	100 by $\frac{13}{24}$	——	$54\frac{1}{6}$

III.

To multiply a mixed number by a ſimple fraction, or a whole number.

Rule III. Reduce the mixed number into an improper fraction, by multiplying the integral part by the denominator of the fracticnal part; and to the product add the numerator of the ſaid fractional part, the ſum is a numerator to the former denominator, then proceed as before.

EXAMPLE.

If $4\frac{1}{2}$ is multiplied by 6, the product will be 27.

Thus,

$$\begin{array}{ccc} 4\frac{1}{2} & & \\ \hline 9 & — & 6 \\ \hline 2 & — & 1 \\ \hline \multicolumn{3}{l}{2\,)\,54} \\ \hline \end{array}$$

Anſ. 27

Multiply the following ſums, viz.

8	by	$5\frac{2}{3}$	the prod. is	$45\frac{1}{3}$	$\frac{3}{4}$	by	$8\frac{1}{3}$	the prod. is	$6\frac{1}{4}$
$7\frac{1}{8}$	by	12	———	$85\frac{1}{2}$	$12\frac{1}{2}$	by	$\frac{3}{8}$	———	$4\frac{11}{16}$
20	by	$10\frac{7}{9}$	———	$215\frac{5}{9}$	$\frac{11}{15}$	by	$10\frac{1}{2}$	———	$7\frac{7}{10}$
$5\frac{5}{6}$	by	100	———	$583\frac{1}{3}$	$\frac{15}{16}$	by	$30\frac{4}{5}$	———	$28\,\frac{7}{8}$

IV.

To multiply mixed numbers by mixed numbers.

RULE IV. Reduce them into an improper fraction by the third rule, and proceed as before.

EXAMPLE.

How much is $5\frac{1}{2}$ times $6\frac{3}{4}$? Anſwer $37\frac{1}{8}$.

$$\begin{array}{ccc} 5\frac{1}{2} & & 6\frac{3}{4} \\ \hline 11 & — & 27 \\ \hline 2 & — & 4 \\ \hline \multicolumn{3}{l}{8\,)\,297} \\ \hline \end{array}$$

Anſwer $37\frac{1}{8}$

Multiply the following ſums, viz.

$37\frac{1}{8}$ by $3\frac{5}{6}$ the product will be $142\frac{5}{16}$

$2\frac{16}{17}$ by $31\frac{11}{19}$ — — — $92\frac{284}{323}$

$19\frac{4}{15}$ by $17\frac{7}{12}$ — — — $338\frac{139}{180}$

$35\frac{13}{16}$ by $11\frac{17}{25}$ — — — $418\frac{29}{100}$

V.

To multiply compound fractions obſerve the firſt rule.

EXAMPLE.

How much is $\frac{1}{2}$ of $\frac{1}{4}$ of $\frac{1}{5}$? Anſwer $\frac{1}{40}$.

$$\frac{1}{2} — \frac{1}{4} — \frac{1}{5} \qquad \begin{array}{r} 2 \\ 4 \\ \hline 8 \\ 5 \\ \hline 40 \end{array}$$

$$\frac{1}{40}$$

Multiply the following fractions, viz.

$\frac{7}{8}$ of $\frac{1}{3}$ by $\frac{2}{5}$ the product will be $\frac{7}{60}$

$\frac{1}{2}$ of $\frac{1}{4}$ by 16 — — 2

$\frac{2}{5}$ of $\frac{3}{7}$ by $\frac{11}{12}$ — — $\frac{11}{70}$

$\frac{3}{4}$ of $\frac{1}{3}$ by $11\frac{7}{8}$ — — $2\frac{31}{32}$

$\frac{7}{16}$ of $3\frac{4}{7}$ by 8 — — $12\frac{1}{2}$

VI.

The uſe.

1. How many pence are in $\frac{5}{6}$ of a ſhilling? Anſwer 10d.

EXAMPLE.

$$\frac{5}{6} — \frac{12}{1}$$

$$\begin{array}{l} \hline 6\ )\ 60 \\ \hline 10 \end{array}$$

2. How many pence are in $\frac{2}{3}$ of a ſhilling? Anſwer 8d.
3. How many ſhillings are in $\frac{4}{5}$ of a pound? Anſ. 16s.
4. How much is $\frac{1}{8}$ of 1 cwt.? Anſwer 14 lb.
5. What is the value of $\frac{11}{16}$ of a pound? Anſ. 13s. 9d.
6. How much is $\frac{2}{7}$ of 1 cwt.? Anſwer 32 lb.
7. What is the $\frac{5}{8}$ of a pound? Anſwer 12s. 6d.
8. How much is $\frac{5}{8}$ of a pound avoirdupois? Anſwer 10 oz.

VII.

9. What is the value of $\frac{1}{4}$ of $\frac{3}{4}$ of a ſhilling? Anſwer $2\frac{1}{4}$d.

$$\frac{1}{4} — \frac{3}{4} — \frac{12}{1}$$

```
16 ) 36 ( 2¼
     32
     ——
      4
      4
     ——
16 ) 16 ( ¼
     16
     ——
```

10. What is the value of $\frac{7}{8}$ of $\frac{3}{4}$ of a pound ſterling? Anſwer 13s. $1\frac{1}{2}$d.
11. How much is $\frac{3}{16}$ of $\frac{2}{3}$ of a pound ſterling? Anſwer 2s. 6d.
12. If 1 yard of cloth coſt 17d. what will half a quarter come to? Anſwer $2\frac{1}{8}$d.
13. What will $\frac{1}{3}$ of $\frac{3}{4}$ of an ounce avoirdupois come to at 7s. the lb.? Anſwer $1\frac{5}{16}$d.

VIII.

14. If 1 yard of cloth coſt 2s. 6d. what will $2\frac{1}{2}$ yards come to? Anſwer 6s. 3d.

```
2½          2½
—           —
5  ———————  5
—           —
2  ———————  2
————————————
   4 ) 25
   —————————
      6  3
```

15. What will $6\frac{1}{4}$ lb. of indigo come to at 5s. 6d. the lb.? Anſwer 1l. 14s. $4\frac{1}{2}$d.

16. If 1 ounce of ſilk coſt $7\frac{3}{4}$d. what will $3\frac{1}{4}$ ounces come to? Anſwer 2s. $1\frac{3}{16}$d.

17. How much will 10 yards and half a quarter of cloth come to at the rate of $11\frac{3}{4}$s. the yard? Anſwer 5l. 18s. $11\frac{5}{8}$d.

18. How many ſquare feet are in a plank of $20\frac{1}{2}$ feet long, and 15 inches broad? Anſwer $25\frac{5}{8}$ feet.

19. How many ſquare yards are in a wainſcot of 9 feet 8 inches high, and 15 feet 3 inches broad? Anſwer 16 yards, $3\frac{5}{12}$ feet.

20 What would the workmanſhip of a wall come to of $60\frac{1}{2}$ rods long, and $\frac{1}{4}$ of a rod high, at 2s. $6\frac{1}{2}$d. the rod? Anſwer 1l. 18s. $5\frac{5}{16}$d.

21. A floor of $3\frac{1}{2}$ yards broad, and $5\frac{1}{3}$ yards long, being laid with ſtones at the rate of $5\frac{1}{2}$s. the ſquare yard; what does it amount to? Anſwer 5l. 2s. 8d.

22. How much would the painting of a wainſcotted room come to of 16 feet ſquare, and 11 high, at the rate of $6\frac{1}{2}$d. the ſquare yard? Anſwer 2l. 2s. $4\frac{4}{9}$d.

23. How much will an oak plank come to of $20\frac{1}{2}$ feet long, and $1\frac{1}{4}$ foot broad, at $6\frac{1}{2}$d. the ſquare foot? Anſwer 13s. $10\frac{5}{16}$d.

24. How many cubical feet are in 100 ſtones of 28 inches long, 21 inches broad, and 8 inches thick? Anſ. $272\frac{2}{9}$ ft.

25. How many cubical feet are in a beam of $22\frac{1}{4}$ feet long, 13 inches broad, and 8 inches thick? Anſwer $16\frac{5}{72}$ feet.

26. What will $7\frac{1}{8}$ ounces of ſilver come to, if one ounce coſt $5\frac{1}{4}$s.? Anſwer 1l. 17s. $4\frac{7}{8}$d.

27. A. has $\frac{1}{2}$ of a ſhip of which he ſells to B. $\frac{3}{4}$, and B. ſells out of his ſhare to C. $\frac{1}{2}$: I demand what ſhare C. has in the ſhip, and alſo A. and B's ſhare. Anſ. A. $\frac{1}{8}$, B. $\frac{3}{16}$, and C. $\frac{3}{16}$.

28. How many tiles of 12 inches ſquare would lay a floor of $15\frac{3}{4}$ feet broad, and $17\frac{1}{4}$ feet long? Anſ. $271\frac{10}{16}$ tiles.

29. Suppoſe a marble ſtone $6\frac{1}{2}$ feet long, $4\frac{3}{4}$ feet broad, and $2\frac{1}{3}$ feet thick, was ſold at $5\frac{1}{2}$s. the cubical foot; I demand what it would amount to. Anſwer 19l. 16s. $2\frac{3}{4}$d.

30. If an ounce of gold is worth 4l. what is one grain worth? Anſwer 2d.

CHAP. XI.

SUBTRACTION OF FRACTIONS.

SECT. I.

To ſubtract ſimple fractions from ſimple fractions which have one common denominator.

RULE I. Subtract the leſſer numerator from the greater, and under the remainder place the denominator.

EXAMPLE.

From	$\frac{5}{7}$	$\frac{5}{8}$	$\frac{11}{12}$	$\frac{15}{16}$	$\frac{17}{35}$	$\frac{105}{209}$
Take	$\frac{2}{7}$	$\frac{3}{8}$	$\frac{5}{12}$	$\frac{3}{16}$	$\frac{13}{35}$	$\frac{6}{209}$
	—	—	—	—	—	—
Rem.	$\frac{3}{7}$	$\frac{1}{4}$				
	—	—	—	—	—	—

II.

To ſubtract a fraction or mixed number from a whole number.

Rule II. Take the numerator from the denominator, and under the remainder place the denominator, then carry 1 to be ſubtracted from the whole number.

EXAMPLE.

From	1,	3,	6,	10,	9,	100
Take	$0\frac{3}{5}$,	$0\frac{3}{16}$,	$0\frac{7}{8}$,	$0\frac{1}{10}$,	$5\frac{1}{2}$,	$99\frac{99}{100}$ *
Rem.	$\frac{2}{5}$,	$2\frac{13}{16}$				

III.

To ſubtract mixed numbers from mixed numbers, having common denominators.

Rule III. By rule the firſt, ſubtract the fractional part, and then ſubtract the integer.

EXAMPLE.

From	$3\frac{2}{3}$,	$100\frac{3}{4}$,	$19\frac{15}{16}$,	$97\frac{15}{24}$,	$99\frac{21}{24}$
Take	$2\frac{1}{3}$,	$10\frac{3}{4}$,	$11\frac{7}{16}$,	$8\frac{11}{24}$,	$7\frac{19}{24}$
Rem.	$1\frac{1}{3}$,	90			

IV.

To ſubtract ſimple fractions which have no common denominator.

Rule IV. By the third or fourth rule of the third ſection of Addition of Fractions, find a common denominator, in which divide each particular denominator, whoſe quotient multiply by its numerator, and thoſe products ſubtract, and the remainder will be a new numerator to the common denominator, and the anſwer required.

EXAMPLE.

What differs $\frac{2}{3}$ from $\frac{7}{9}$? Anſ. $\frac{1}{9}$.

Com. deno.

$$\begin{array}{lcl} 3)\frac{2}{3}\quad\frac{7}{9} & \qquad & 9\text{———}7 \\ \hline \quad 1\quad 3 & & \qquad\quad\; 6 \\ & & \qquad\quad\; \overline{} \\ & & \text{Anſ. } \frac{1}{9} \end{array}$$

Subtract the following fractions, viz.

From	$\frac{5}{8}$	$\frac{11}{12}$	$\frac{5}{6}$	$\frac{14}{15}$	$\frac{8}{15}$	$\frac{17}{21}$	$\frac{209}{216}$
Take	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{4}{5}$	$\frac{3}{5}$	$\frac{9}{20}$	$\frac{9}{14}$	$\frac{7}{144}$
Rem.							

V.

To ſubtract a fraction or mixed number, when the fractional part to be ſubtracted is greater than the fractional part from whence it is to be ſubtracted.

Rule V. Find a common denominator, &c. as in the preceding ſection; then add the new found numerator of the leſſer fraction to the common denominator, and from that ſum ſubtract the new found numerator of the greater fraction, and the remainder ſet as a new numerator over the common denominator, then carry 1 to the integral part of the ſubtrahend, and ſubtract as in whole numbers.

EXAMPLE.

Subtract $2\frac{1}{3}$ from $5\frac{1}{4}$.

$$\begin{array}{rlccr} & 5\frac{1}{4} & \frac{1}{3} & \frac{1}{4} & 12\text{———}3 \\ & 2\frac{1}{3} & & & 4 \\ \cline{2-2} \cline{5-5} \text{Anſ.} & 2\frac{11}{12} & & & \frac{11}{12} \end{array}$$

Subtract the following ſums, viz.

From	$6\frac{5}{7}$	$12\frac{5}{12}$	$10\frac{3}{10}$	$19\frac{5}{11}$	$13\frac{1}{9}$
Take	$0\frac{6}{7}$	$6\frac{1}{2}$	$1\frac{7}{12}$	$0\frac{7}{15}$	$9\frac{13}{27}$
Rem.	$5\frac{6}{7}$				

What differs $\frac{9}{14}$ from $\frac{17}{21}$? Anſwer $\frac{1}{6}$.
What does $\frac{7}{144}$ differ from $\frac{209}{216}$? Anſwer $\frac{397}{432}$.
What difference is there between $10\frac{7}{8}$ and $12\frac{1}{2}$? Anſ. $1\frac{5}{8}$.
Take $10\frac{1}{12}$ from $100\frac{1}{32}$. Remains $89\frac{91}{96}$.
What does $\frac{9}{20}$ differ from $\frac{8}{15}$? Anſw. $\frac{1}{12}$.

What differs $\frac{9}{16}$ from $\frac{1}{3}$? Anſ. $\frac{11}{48}$.
Take $\frac{1}{3}$ of $\frac{3}{4}$ from $10\frac{1}{12}$. Anſ. $9\frac{5}{6}$.
From $14\frac{1}{8}$ take $\frac{1}{2}$ of $\frac{2}{3}$ of $\frac{3}{4}$. Anſ. $13\frac{7}{8}$.

CHAP. XII.

DIVISION OF FRACTIONS.

SECT. I.

To divide ſimple fractions.

RULE I. Set the dividend to the left hand of the diviſor, and multiply acroſs, that is, the denominator of the diviſor by the numerator of the dividend, and the product is a new numerator, then multiply the denominator of the dividend by the numerator of the diviſor, and the product is a new denominator.

EXAMPLE.

Divide $\frac{1}{4}$ by $\frac{3}{4}$. Anſ. $\frac{1}{3}$.

$$\frac{1}{4}\times\frac{3}{4}$$

$$4\left\{\frac{4}{12}\middle|\frac{1}{3}\right.$$

Examples of the ſame nature.

$\frac{1}{5}$ by	$\frac{2}{5}$	comes	$\frac{1}{2}$	$\frac{3}{4}$ by	$\frac{8}{9}$	comes	$\frac{27}{32}$
$\frac{5}{9}$ by	$\frac{8}{9}$	——	$\frac{5}{8}$	$\frac{1}{3}$ by	$\frac{5}{6}$	——	$\frac{2}{5}$
$\frac{3}{4}$ by	$\frac{1}{4}$	——	3	$\frac{15}{16}$ by	$\frac{5}{8}$	——	$1\frac{1}{2}$
$\frac{11}{15}$ by	$\frac{19}{20}$	——	$\frac{44}{57}$	$\frac{23}{35}$ by	$\frac{21}{27}$	——	$\frac{621}{735}$

II.

To divide a whole number by a ſimple fraction, and the contrary.

RULE II. Make the whole number an improper fraction, by putting a unit for a denominator, and then proceed as before.

EXAMPLE.

Divide 4 by $\frac{1}{2}$, the quotient is 8.

Dividend

$$\begin{array}{c}\frac{4}{1} \times \frac{1}{2} \\ \hline 1)\ 8\ (8\end{array}$$

Divide the following fractions, viz.

$\frac{1}{2}$ by 4	comes	$\frac{1}{8}$	1 by $\frac{1}{3}$	comes	3
8 by $\frac{3}{4}$	——	$10\frac{2}{3}$	$\frac{5}{6}$ by 15	——	$\frac{1}{18}$
$\frac{3}{4}$ by 8	——	$\frac{3}{32}$	24 by $\frac{5}{8}$	——	$38\frac{2}{5}$
10 by $\frac{5}{6}$	——	12	$\frac{5}{6}$ by 100	——	$\frac{1}{120}$

III.

To divide a mixed number by a ſimple fraction, and the contrary.

RULE III. Reduce the mixed number into an improper fraction, by the third rule of Multiplication of Fractions, and proceed as before.

EXAMPLE.

How often is $\frac{1}{2}$ contained in $2\frac{1}{2}$? Anſ. 5 times.

$$\begin{array}{c}2\frac{1}{2} \\ \hline \frac{5}{2} \times \frac{1}{2} \\ \hline 2)\,10(5\end{array}$$

Divide the following fractions, viz.

$3\frac{1}{8}$ by $\frac{3}{8}$	Anſwer	$8\frac{1}{3}$	$4\frac{1}{2}$ by $\frac{3}{4}$	Anſwer	6
$\frac{3}{4}$ by $4\frac{1}{2}$	——	$\frac{1}{6}$	$\frac{3}{8}$ by $3\frac{1}{8}$	——	$\frac{3}{25}$
$12\frac{1}{9}$ by $\frac{5}{18}$	——	$43\frac{3}{5}$	$2\frac{1}{3}$ by $\frac{7}{8}$	——	$2\frac{2}{3}$
$\frac{7}{8}$ by $2\frac{1}{3}$	——	$\frac{3}{8}$	$\frac{5}{14}$ by $2\frac{1}{7}$	——	$\frac{1}{6}$

IV.

To divide a whole number by a mixed number, and the contrary.

Rule IV. Reduce both the whole number and the mixed number into improper fractions, and proceed as before.

EXAMPLE.

Divide 3 by $4\frac{4}{5}$, the product is $\frac{5}{8}$.

$$\begin{array}{ccc} & & 4\frac{4}{5} \\ \hline \frac{3}{1} & \times & \frac{24}{5} \\ \hline \end{array}$$

$$3\left\{ \begin{array}{c|c} \frac{15}{24} & \frac{5}{8} \end{array} \right.$$

Divide the following fractions, viz.

7 by $8\frac{5}{8}$	quotient $\frac{56}{69}$	108 by $6\frac{3}{7}$	quotient $16\frac{4}{5}$
$25\frac{1}{2}$ by 5	——— $5\frac{1}{10}$	$119\frac{1}{4}$ by 8	——— $14\frac{29}{32}$
34 by $3\frac{7}{9}$	——— 9	25 by $3\frac{1}{5}$	——— $7\frac{13}{16}$
$1\frac{1}{9}$ by 15	——— $0\frac{2}{27}$	$9\frac{3}{7}$ by 11	——— $0\frac{6}{7}$

V.

To divide mixed numbers by mixed numbers, and the contrary.

Rule V. Reduce them both into improper fractions, and proceed as before.

EXAMPLE.

Divide $5\frac{1}{3}$ by $6\frac{1}{2}$, the product is $\frac{32}{39}$.

$$\begin{array}{ccc} 5\frac{1}{3} & & 6\frac{1}{2} \\ \hline \frac{16}{3} & \times & \frac{13}{2} \\ \hline \end{array}$$

Anſ. $\frac{32}{39}$

Divide the following ſums, viz.

$9\frac{3}{4}$ by $13\frac{1}{2}$	quotient $\frac{13}{18}$	$10\frac{5}{6}$ by $4\frac{2}{3}$	quotient $2\frac{9}{28}$
$1\frac{1}{13}$ by $5\frac{5}{39}$	——— $\frac{21}{100}$	$60\frac{9}{16}$ by $26\frac{11}{12}$	——— $2\frac{1}{4}$
$6\frac{1}{2}$ by $5\frac{1}{3}$	——— $1\frac{7}{32}$	$1\frac{1}{2}$ by $2\frac{1}{2}$	——— $0\frac{3}{5}$

VI. The

VI.

The Uſe of Diviſion.

1. What part of a pound is 9s? Anſ. $\frac{9}{20}$.

$$\frac{9}{1} \times \frac{20}{1}$$

$$\text{Anſ. } \frac{9}{20}$$

2. What part of a pound is 15s.? Anſ. $\frac{3}{4}$.
3. What part of a pound troy weight is 4 oz.? Anſ. $\frac{1}{3}$.
4. What part of a cwt. is 84 lb.? Anſ. $\frac{3}{4}$.
5. What part of a tun is 4 cwt.? Anſ. $\frac{1}{5}$.
6. What part of a ſhilling is 8d.? Anſ. $\frac{2}{3}$.
7. What part of a ſhilling is $\frac{1}{2}$ d.? Anſ. $\frac{1}{24}$.
8. What part of a pound avoirdupois is $\frac{3}{4}$ of an ounce? Anſ. $\frac{3}{64}$.
9. What part of a penny is $\frac{1}{2}$ a farthing? Anſ. $\frac{1}{8}$.
10. What part of a ſhilling is $\frac{3}{4}$ d.? Anſ. $\frac{1}{16}$.
11. What part of a pound is $\frac{5}{6}$ s.? Anſ. $\frac{1}{24}$.
12. What part of a cwt. is $\frac{1}{4}$ lb.? Anſ. $\frac{1}{448}$.
13. What part of a lb. troy is $\frac{1}{4}$ of an ounce? Anſ. $\frac{1}{48}$.

VII.

14. What part of a pound is 2s. 6d.? Anſ. $\frac{1}{8}$.

$$\begin{array}{c} 2\frac{1}{2} \\ \hline \frac{5}{2} \times \frac{20}{1} \\ \hline 5\left\{ \frac{5}{40} \middle| \frac{1}{8} \right. \end{array}$$

15. What part of a pound is 6s. 8d.? Anſ. $\frac{1}{3}$.
16. What part of a ſhilling is $1\frac{1}{2}$d. Anſ. $\frac{1}{8}$.
17. What part of a pound is 3s. 4d.? Anſ. $\frac{1}{6}$.
18. What part of a pound is 12s. 6d.? Anſ. $\frac{5}{8}$.
19. What part of a gallon is $1\frac{1}{2}$ pint? Anſ. $\frac{3}{16}$.
20. What part of a pound is 8s. 9d.? Anſ. $\frac{7}{16}$.
21. What part of a ſhilling is $5\frac{1}{4}$d.? Anſ. $\frac{7}{16}$.

VIII.

22. What part of a pound is 6s. $2\frac{1}{2}$d.? Anſ. $\frac{149}{480}$.

$$\begin{array}{c} s. \quad d. \\ 6 \quad 2\frac{1}{2} \\ \underline{12} \\ 74 \\ \underline{2} \\ \frac{149}{2} \times \frac{240}{1} \\ \hline \frac{149}{480} \end{array}$$

23. What part of a pound is 11s. $4\frac{1}{2}$d.? Anſ. $\frac{91}{160}$.
24. What part of a cwt. is 3 qrs. 7 lb.? Anſ. $\frac{13}{16}$.
25. What part of a pound is 5s. $0\frac{3}{4}$d.? Anſ. $\frac{81}{320}$.
26. What part of a cwt. is 2 qrs. 8 lb.? Anſ. $\frac{4}{7}$.
27. What part of a cwt. is 4 lb. $1\frac{1}{3}$ oz.? Anſ. $\frac{7}{192}$.
28. What part of a lb. troy is 7 dwts. $3\frac{1}{2}$ grains? Anſ. $\frac{343}{11520}$.
29. One qr. $3\frac{1}{2}$ nails, what part of a yard is it? Anſ. $\frac{15}{32}$.
30. What part of a tun is 7 gallons, $3\frac{1}{2}$ qts.? Anſ. $\frac{1}{32}$.
31. What part of a pound is 19s. $11\frac{3}{4}$d.? Anſ. $\frac{959}{960}$.

CHAP. XIII.

QUESTIONS TO EXERCISE FRACTIONS PROMISCUOUSLY SET DOWN.

1. What part is 176 of 368? Anſ. $\frac{11}{23}$.
2. What part of $148\frac{4}{5}$ is 124? Anſ. $\frac{5}{6}$.
3. What part of $33\frac{2}{42}$ is $28\frac{11}{12}$? Anſ. $\frac{7}{8}$.
4. How many dwts. are in $\frac{5}{8}$ of an oz. and $5\frac{3}{4}$ dwts.? Anſ. $18\frac{1}{4}$.

5. What differs $7\frac{3}{4}$d. from $3\frac{1}{3}$s.? Anſ. 2s. $8\frac{1}{4}$d.

6. What will be left if I take $13\frac{5}{6}$s. and $7\frac{5}{8}$d. from 1l.? Anſ. 5s. $6\frac{3}{8}$d.

7. What number is it when added to $\frac{1}{8}$, $\frac{1}{12}$, $\frac{1}{18}$, together will make $\frac{25}{37}$? Anſ. $\frac{1097}{2664}$.

8. Which of the two is the greater fraction $\frac{11}{12}$ or $\frac{15}{16}$? Anſ. $\frac{15}{16}$ is greater by $\frac{1}{48}$.

9. Of what number is 176 the $\frac{11}{23}$ part? Anſ. 368.

10. How much is $\frac{5}{8}$ of $\frac{7}{9}$ of $\frac{3}{4}$ of 20 ſhillings? Anſ. $7\frac{7}{24}$s.

11. Of what number is $57\frac{5}{6}$ the $\frac{7}{8}$? Anſ. $66\frac{2}{21}$.

12. What number is it, to which if you add $\frac{2}{3}$, $\frac{3}{4}$, $\frac{5}{8}$, and $\frac{7}{12}$ leſs $\frac{15}{16}$, the product will be 2? Anſ. $\frac{5}{16}$.

13. How often muſt I multiply $\frac{5}{9}$ by $\frac{3}{5}$ that the product be $\frac{4}{7}$? Anſ. $1\frac{5}{7}$ times.

14. By how much muſt I multiply $13\frac{2}{3}$ that the product ſhall be $49\frac{1}{5}$? Anſ. by $3\frac{3}{5}$.

15. How much is $19\frac{5}{8}$s. and $4\frac{1}{2}$d.? Anſ. 20s.

16. If $\frac{5}{6}$ of a pound is 16s. 8d. how many ſhillings are there in 1l.? Anſ. 20s.

17. How much is $\frac{3}{8}$s. and $3\frac{2}{3}$d.? Anſ. $8\frac{1}{6}$d.

18. How many ſtones of $1\frac{3}{4}$ foot long, $\frac{2}{3}$ foot broad, and $\frac{3}{4}$ foot thick, are equal to 50 ſtones of $3\frac{1}{3}$ feet long, $2\frac{1}{2}$ feet broad, and $1\frac{1}{5}$ foot thick? Anſ. $571\frac{3}{7}$.

19. What will $\frac{1}{3}$ of $\frac{3}{4}$ of 2 dwts. of ſilver come to, at 5s. $11\frac{3}{4}$d. the oz.? Anſ. $1\frac{127}{160}$d.

20. If 1 yard of Flanders lace coſt 9s. $3\frac{3}{4}$d. what will $5\frac{3}{4}$ yards and 3 nails come to? Anſ. 2l. 15s. $3\frac{33}{64}$d.

21. Find 2 numbers ſo that the $\frac{13}{18}$ of the one will be as much as the $\frac{7}{16}$ of the other. Anſ. 126 and 208, or 63 and 104.

22. A merchant has $\frac{3}{4}$ ſhare in a ſhip, of which he ſells $\frac{1}{4}$ ſhare for 250l. I demand the value of the whole ſhip at that rate. Anſ. $1333\frac{1}{3}$l. or 6s. 8d.

CHAP. XIV.

THE RULE OF THREE DIRECT IN FRACTIONS.

SECT. I.

RULE.

As in the Rule of Three in whole numbers, ſo likewiſe in Fractions, let your firſt and laſt number be of one name.

Secondly. Bring the denominator of your firſt number either under the ſecond or laſt number.

Thirdly. The denominators of the ſecond and third numbers being multiplied into each other, bring their product under the firſt number.

Fourthly. If there be any given mixed numbers, multiply the integral part by the denominator, and take in the numerator, then tranſpoſe the denominators as before.

EXAMPLE.

1. If $\frac{1}{4}$ yard coſt $\frac{2}{3}$s. what will $\frac{7}{8}$ yard come to? Anſwer $2\frac{1}{3}$s.

$$\begin{array}{lcccc}
 & yd. & & s. & yd. \\
\text{If} & \frac{1}{4} & \times & \frac{2}{3} & \frac{7}{8} \\
 & 24 & & & 4 \\
 & & & & 2 \\
 & & & & \overline{8} \\
 & & & & 7 \\
 & & & & \overline{}
\end{array}$$

$$\begin{array}{r}
24\ )\ 56\ (\ 2\frac{1}{3} \\
48 \\
\hline
8\left\{\frac{8}{24}\middle|\frac{1}{3}\right.
\end{array}$$

2. How much will $\frac{7}{8}$ yard of lace come to if $\frac{1}{4}$ yard coſt $\frac{2}{3}$s.? Anſwer $2\frac{1}{3}$s.

3. If $\frac{3}{8}$ yard coſt $\frac{15}{32}$ of a pound, what coſt $\frac{2}{3}$ yard? Anſwer 16s. 8d.

4. What will $\frac{8}{9}$ lb. coſt, if $\frac{2}{5}$s. buy $\frac{7}{8}$ lb.? Anſwer $4\frac{92}{105}$d.

II.

5. If $2\frac{1}{2}$ gives $3\frac{1}{3}$ what will $4\frac{3}{4}$? Anſwer $6\frac{1}{3}$.

$$\begin{array}{lll} \frac{5}{2} \times \frac{10}{3} & & \frac{19}{4} \\ 60 & & 60\,)\,380\,(\,6\frac{1}{3} \\ & & 360 \\ & & 20\left\{\begin{array}{c|c} \frac{20}{60} & \frac{1}{3} \end{array}\right. \end{array}$$

6. If $\frac{4}{7}$ of an oz. avoirdupois weight coſt $10\frac{1}{2}$d. what coſt $\frac{5}{14}$ lb.? Anſwer 8s. 9d.

7. If $19\frac{1}{5}$ lb. coſt $\frac{9}{10}$l. what quantity can I have for $\frac{5}{8}$s.? Anſwer $\frac{2}{3}$ lb.

8. What will $\frac{1}{2}$ cwt. come to if $6\frac{3}{4}$ cwt. coſt $21\frac{3}{4}$l.? Anſwer 1l. 12s. $2\frac{2}{3}$d.

9. If $\frac{1}{2}$ cwt. coſt 32s. $2\frac{2}{3}$d. what will $6\frac{3}{4}$ cwt. come to? Anſwer $21\frac{3}{4}$l.

10. How many cwt. can I have for $21\frac{3}{4}$l. if $\frac{1}{2}$ cwt. coſt 32s. $2\frac{2}{3}$d.? Anſwer $6\frac{3}{4}$ cwt.

11. If $\frac{1}{4}$ cwt. coſt 1l. $1\frac{3}{4}$s. how much can be bought for $38\frac{1}{4}$s.? Anſwer 1 qr. $21\frac{7}{29}$ lb.

12. What will $1\frac{1}{2}$ cwt. of pepper come to if $15\frac{1}{4}$ lb. coſt $12\frac{3}{8}$s.? Anſwer 6l. 16s. $3\frac{57}{61}$d.

III.

13. If 1 lb. of ſilk coſt $16\frac{2}{3}$s. how many pounds can I have then for $37\frac{1}{2}$s.? Anſwer $2\frac{1}{4}$ lb.

$$\begin{array}{lccc}
 & \text{s.} & & \text{s.}\\
 & 16\frac{2}{3} & \text{lb.} & 37\frac{1}{2}\\
\text{If} & \frac{50}{3} & \frac{1}{1} & \frac{75}{2}\\
\hline
 & 50 & & 75\\
 & 2 & & 3\\
\cline{2-2}\cline{4-4}
 & 100 & - & 100)\,225\,(\,2\frac{1}{4}\text{ lb.}\\
 & & & 200\\
\cline{4-4}
 & & & 25\left\{\frac{25}{100}\right|\frac{1}{4}
\end{array}$$

14. How many pounds of pot-aſhes can I have for 12¼d. if 1 lb. coſt 1¾d.? Anſwer 7 lb.

15. If 1 quart of rum coſt 2¾s. how many quarts can I have for 38½s.? Anſwer 14.

16. If for 10⅓s. I buy 1 hundred of oranges, how many hundred can I have then for 105$\frac{11}{12}$s.? Anſ. 10¼ hund.

IV.

17. If 1 ounce of ſilver coſt 5⅔s. what will ¾ ounce come to? Anſwer 4¼s.

$$\begin{array}{lcccc}
 & & & \text{s.} & \\
 & & & 5\frac{2}{3} & \\
 & \text{oz.} & & & \text{oz.}\\
\text{If} & \frac{1}{1} & \times & \frac{17}{3} & \frac{3}{4}\\
\hline
 & 12 & & 17 & \\
 & & & 3 & \\
\cline{4-4}
 & & & 2)\,51 & \\
\cline{4-4}
 & & & 4\frac{1}{4}\text{s.} &
\end{array}$$

18. What will $\frac{1}{4}$ yard come to, if 1 yard coſt $13\frac{1}{2}$s.? Anſwer $3\frac{3}{8}$s.

19. If 1 lb. of any thing coſt $5\frac{1}{4}$s. what will $\frac{7}{8}$ lb. come to? Anſwer 4s. $7\frac{1}{8}$d.

20. How much will $\frac{1}{4}$ cwt. come to at the rate of $15\frac{3}{4}$s. the cwt.? Anſwer 3s. $11\frac{1}{4}$d.

V.

21. If 1 lb. of ſpice coſt $\frac{3}{4}$s. how much will $\frac{7}{8}$ lb. come to? Anſwer $7\frac{7}{8}$d.

lb. *s.* *lb.*

$$\text{If } \frac{1}{1} \times \frac{3}{4} \quad \frac{7}{8}$$

32 21

12

$$32)\,252\,(\,7\tfrac{7}{8}$$

224

$$4\left\{\frac{28}{32}\right|\frac{7}{8}$$

22. What will $\frac{14}{15}$ lb. come to at $\frac{5}{8}$s. the pound? Anſwer 7d.

23. If 1 cwt. coſt $\frac{8}{9}$ of a pound, what will $\frac{3}{4}$ cwt. come to? Anſwer $\frac{2}{3}$l. or 13s. 4d.

24. What will $\frac{1}{2}$ a pint of wine come to, if a gallon coſt $\frac{1}{3}$l.? Anſwer 5d.

VI.

25. If for $\frac{9}{10}$ of a pound I have a yard of cloth, how many yards can I have for $\frac{15}{16}$l.? Anſwer $1\frac{1}{24}$ yards.

$$\begin{array}{lccc}
 & \mathit{l.} & \mathit{yd.} & \mathit{l.} \\
\text{If} & \dfrac{9}{10} & \dfrac{1}{1} & \dfrac{15}{16} \\
\hline
 & 144 & & 15 \\
 & & & 10 \\
\end{array}$$

$$\begin{array}{r}
144\,)\,150\,(\,1\tfrac{1}{24} \\
144 \\
\hline
6\left\{\dfrac{6}{144}\middle|\dfrac{1}{24}\right.
\end{array}$$

26. What will $\frac{5}{8}$ lb. coſt, if $\frac{5}{6}$ lb. coſt 1l.? Anſwer $\frac{3}{4}$l. or 15s.

27. If for $\frac{8}{9}$l. I have 1 cwt. how much can I have then for $\frac{2}{3}$l. Anſwer $\frac{3}{4}$ cwt.

28. How many ounces can I have for $\frac{8}{9}$s. if 1 ounce coſt $\frac{2}{3}$s.? Anſwer $1\frac{1}{3}$ ounce.

VII.

29. If $\frac{3}{4}$ yard of cloth coſt $\frac{2}{3}$l. what will 1 yard coſt? Anſwer 17s. $9\frac{1}{3}$d.

$$\begin{array}{lccc}
 & \mathit{yd.} & \mathit{l.} & \mathit{yd.} \\
\text{If} & \dfrac{3}{4} & \dfrac{2}{3} & \dfrac{1}{1} \\
\hline
 & 3 & 2 & \\
 & 3 & 4 & \\
\cline{2-3}
 & 9 & 8 & \\
 & & 20 & \\
\cline{3-3}
 & & 9\,)\,160 & \\
\cline{3-3}
 & & 17\ \ 9\frac{1}{3} & \\
\end{array}$$

30. What will 1 yard coſt if $\frac{7}{8}$ yard coſt $\frac{14}{15}$l.? Anſwer $1\frac{1}{15}$ l.

31. How much will 1 lb. coſt if $\frac{2}{3}$ lb. coſt $\frac{7}{8}$s.? Anſwer $1\frac{5}{16}$s.

32. If 3 pennyweights of ſilver coſt $\frac{3}{4}$s. what is 1 ounce worth? Anſwer 5s.

33. If $\frac{5}{6}$ of a lb. coſt 15d. what coſt 1 lb.? Anſ. 1s. 6d.

34. What will 1 yard come to if $\frac{3}{4}$ yard coſt 18d.? Anſwer 2s.

35. If half a quarter of Flanders lace coſt 3s. what is that a yard? Anſwer 24s.

36. How much would 1 lb. of ſpice coſt, if $\frac{2}{3}$ lb. coſt 7s.? Anſwer $10\frac{1}{2}$s.

VIII.

37. If 1 tun coſt 35l. what coſt $\frac{3}{4}$ of a tun? Anſ. $26\frac{1}{4}$l.

$$\begin{array}{lccc}
 & \textit{tun} & \textit{l.} & \textit{tun} \\
\text{If} & \frac{1}{1} & \frac{35}{1} & \frac{3}{4} \\
\hline
 & 4 & 35 & \\
 & & \underline{\quad 3} & \\
 & 4\,) & \underline{105} & \\
 & & 26\frac{1}{4} &
\end{array}$$

38. How much will half a quarter of a yard of lace come to at 46d. the yard? Anſwer $5\frac{3}{4}$d.

39. If 1 ounce of ſilver coſt 5s. how much will $\frac{5}{8}$ of an ounce come to? Anſwer 3s. $1\frac{1}{2}$d.

40. At 25s. per cwt. how much will $\frac{3}{4}$ of a cwt. come to? Anſwer 18s. 9d.

41. If 1 yard of linen coſt $\frac{3}{4}$s. what will 1 piece containing 40 yards come to? Anſwer 1l. 10s.

42. What will 7 lb. of cloves coſt, if 1 lb. coſt $\frac{3}{10}$l.? Anſwer 2l. 2s.

43. At $\frac{5}{6}$l. per yard, how much will 42 yards coſt? Anſwer 35l.

44. If 1 lb. of ſugar coſt $\frac{2}{3}$s. how much will 28 lb. coſt? Anſwer 18s. 8d.

45. If 1 yard of cloth coſt $6\frac{2}{3}$s. how much would 789 yards come to? Anſwer 263l.

46. What will 756 lb. of indigo come to at $3\frac{1}{3}$s. the lb.? Anſwer 126l.

47. If 1 lb. of butter coſt $8\frac{1}{4}$d. what will 112 lb. come to? Anſwer 3l. 17s.

48. How much will 650 lb. come to at $3\frac{3}{4}$s. the lb.? Anſwer 121l. 17s. 6d.

IX.

49. How much will $\frac{1}{2}$ of $\frac{3}{4}$ yard coſt, if $\frac{4}{9}$ yard coſt $\frac{7}{8}$ ducatoon of 6s. value? Anſwer 4s. $5\frac{5}{32}$d.

$$\begin{array}{cccc} & & & \frac{1}{2}\quad\frac{3}{4} \\ \cline{4-4} & \textit{yd.} & \textit{ducat.} & \\ \text{If} & \frac{4}{9} & \frac{7}{8} & \frac{3}{8} \\ \hline & 64 & & 63 \\ & 4 & & 3 \\ \cline{2-2}\cline{4-4} & 256 & & 189 \\ & & & 6 \\ \cline{3-4} \end{array}$$

$$\begin{array}{r} 256\,)\,1134\,(\,4\text{s.}\quad 5\tfrac{5}{32}\text{d.} \\ 1024 \\ \hline 110 \\ 12 \\ \hline 256\,)\,1320\,(\,5\tfrac{5}{32} \\ 1280 \\ \hline \end{array}$$

$$8\left\{\frac{40}{256}\middle|\frac{5}{32}\right.$$

50. If 3 times $\frac{5}{6}$ yard coſt 4 times $\frac{2}{3}$s. what will 5 times $\frac{3}{4}$ yard come to? Anſwer 4s.

51. What will $\frac{1}{4}$, $\frac{1}{6}$ and $\frac{3}{8}$ leſs $\frac{1}{3}$ lb. come to, if $\frac{1}{3}$, $\frac{3}{4}$ and $\frac{5}{8}$ leſs $\frac{5}{6}$ lb. coſt $\frac{1}{2}$, $\frac{2}{3}$, $\frac{1}{7}$, and $\frac{7}{8}$ leſs $1\frac{6}{18}$ quarter guinea? Anſwer 2s. $0\frac{1}{18}$d.

52. A merchant buys 37$\frac{3}{4}$ pieces of cloth at 23$\frac{1}{2}$l. the the piece; he pays in ready money 235$\frac{1}{4}$l. and the reſt he is to pay in brandy at the rate of 7$\frac{2}{3}$s. the gallon: I demand how many gallons he muſt deliver. Anſwer 1700$\frac{25}{46}$.

53. Two pieces of cloth contain, both together, 79$\frac{3}{4}$ yards: I demand how many yards are in each piece, if $\frac{2}{3}$ yard of the one are as long as $\frac{3}{4}$ yard of the other. Anſwer 42$\frac{15}{68}$ yards and 37$\frac{9}{17}$ yards.

54. How much will 2 pieces of cloth come to, No. 1 containing 94$\frac{3}{16}$ yards; No. 2, 305$\frac{7}{9}$ yards, at 10s. 6$\frac{1}{3}$d. per yard; but 4$\frac{2}{3}$ yards of No. 2 are worth but 2$\frac{1}{4}$ yards of No. 1? Anſwer 127l. 10s. 4$\frac{59}{84}$d.

PRACTICE TABLE.

Parts of a pound.

s.	d.		
10		is	$\frac{1}{2}$
6	8		$\frac{1}{3}$
5			$\frac{1}{4}$
4			$\frac{1}{5}$
3	4		$\frac{1}{6}$
2	6		$\frac{1}{8}$
2			$\frac{1}{10}$

Parts of a cwt.

lb.		
56	is	$\frac{1}{2}$
28		$\frac{1}{4}$
16		$\frac{1}{7}$
14		$\frac{1}{8}$
8		$\frac{1}{14}$
7		$\frac{1}{16}$
4		$\frac{1}{28}$

Parts of a ſhilling.

d.		
6	is	$\frac{1}{2}$
4		$\frac{1}{3}$
3		$\frac{1}{4}$
2		$\frac{1}{6}$
1$\frac{1}{2}$		$\frac{1}{8}$
1		$\frac{1}{12}$

Parts of a $\frac{1}{2}$ cwt.

lb.		
28	is	$\frac{1}{2}$
14		$\frac{1}{4}$
8		$\frac{1}{7}$
7		$\frac{1}{8}$

Part of a $\frac{1}{4}$ cwt.

lb.		
14	is	$\frac{1}{2}$
7		$\frac{1}{4}$
4		$\frac{1}{7}$
3$\frac{1}{2}$		$\frac{1}{8}$

CHAP.

CHAP. XV.

PRACTICE

SECT. I.

Practice is a conciſe way of caſting up the price of goods or merchandizes, and is a compendious method of working ſuch queſtions in the Rule of Three as have unity or (1) for their firſt number.

1. If 1 cwt. of cheeſe coſt 37s. 6d. what will $\frac{1}{2}$ a cwt. come to? Anſwer 18s. 9d.

EXAMPLE.

	l.	*s.*
	37	6
cwt. $\frac{1}{2}$ is $\frac{1}{2}$	18	9

2. What will $\frac{1}{4}$ of a cwt. come to at the rate of 29s. 6d. the cwt.? Anſwer 7s. 4$\frac{1}{2}$d.
3. If a yard of cloth coſt 8s. 6d. what will half a yard coſt? Anſwer 4s. 3d.
4. How much will 14 lb. of ſugar come to at 45s. 6d. the cwt.? Anſwer 5s. 8$\frac{1}{4}$d.
5. What will 7 lb. be worth, if 1 cwt. coſt 36s. 4d.? Anſwer 2s. 3$\frac{1}{4}$d.
6. How much is $\frac{1}{8}$ part of 2000l. 11s. 8d.? Anſwer 250l. 1s. 5$\frac{1}{2}$d.

II.

7. If 1 cwt. coſt 2l. 10s. what will $\frac{3}{4}$ cwt. be worth? Anſwer 1l. 17s, 6d.

EXAMPLE.

		l.	*s.*	
		2	10	
cwt.				
$\frac{2}{4}$ is	$\frac{1}{2}$	1	5	
$\frac{1}{4}$ is	$\frac{1}{2}$	0	12	6
	£.	1	17	6

8. What will 2 qrs. 14 lb. come to at the rate of 50s. the cwt.? Anſwer 1l. 11s. 3d.

9. If 1 cwt. coſt 2l. 6s. 6d. what coſt 1 qr. 14 lb.? Anſwer 17s. 5¼d.

10. At 17l. 10s. 8d. the tun, what will 3 cwt. 3 qrs. coſt? Anſwer 3l. 5s. 9d.

11. How much will 12 ounces of ſilk coſt, if 1 lb. coſt 3l. 10s.? Anſwer 2l. 12s. 6d.

12. What will 3 qrs. 21 lb. come to at 37s. 8d. the cwt.? Anſwer 1l. 15s. 3¾d.

III.

13. If 1 lb. of cloves coſt 9s. 4d. what is ½ an ounce worth? Anſwer 3¼d.

		s.	*d.*
		9	4
oz.	*lb.*		
$\frac{1}{2}$ is	$\frac{1}{32}$	0	3½

14. What will 3½ lb. of ſugar come to at the rate of 14s. 4d. the ¼ of a cwt.? Anſwer 1s. 9½d.

15. If 1 yard of Flanders lace coſt 15s. 4d. what coſt 1 nail? Anſwer 11½d.

16. How much will ¾ of an ounce avoirdupois come to, if 1 lb. be worth 9s. 4d.? Anſwer 5¼d.

17. At 23s. 4d. the cwt. what is ½ a lb. worth? Anſwer 1¼d.

18. At 18s. 8d. per cwt. what will ¾ of a lb. come to? Anſwer 1½d.

19. What will ½ a lb. coſt at the rate of 9s. 4d. the cwt.? Anſwer ½d.

20. If an ounce of gold is worth 4l. what is that for 1 grain? Anſwer 2d.

IV.

21. At 4d. the lb. what will 112 lb. come to? Anſwer 1l. 17s. 4d.

lb.
d. 112
4 is $\frac{1}{3}$ ———
2|0) 3|7 4
———
£. 1 17 4

22. What will 379 lb. of ſugar come to at 6d. the lb.? Anſwer 9l. 9s. 6d.
23. If 1 yard coſt 3d. what will 5014 yards come to? Anſwer 62l. 13s. 6d.
24. At 2d. the yard, how much will 758 yards come to? Anſwer 6l. 6s. 4d.
25. At 1½d. the lb. how much will 112 lb. come to? Anſwer 14s.
26. What will 976 lb. come to at 1d. per lb.? Anſwer 4l. 1s. 4d.

V.

27. At 7d. the yard, what will 563 yards coſt? Anſwer 16l. 8s. 5d.

yds.
563
d. ———
6 is $\frac{1}{2}$ 281 6
1 is $\frac{1}{6}$ 46 11
———
2|0) 32|8 5
———
£. 16 8 5

28. If 1 lb. of bacon coſt 5d. what will 1 cwt. coſt? Anſwer 2l. 6s. 8d.
29. How much will 1 cwt. come to at 8d. the lb.? Anſwer 3l. 14s. 8d.
30. If 1 lb. coſt 10d. what will 795 lb. coſt? Anſwer 33l. 2s. 6d.
31. At 11d. the yard, what will 7576 yards come to? Anſwer 347l. 4s. 8d.

32. If 1 lb. of ſugar coſt 6½d. what muſt be paid for 1000 lb.? Anſwer 27l. 1s. 8d.

33. If 1 ounce of tea coſt 6¾d. what muſt I pay for 75642 ounces? Anſwer 2127l. 8s. 7½d.

34. At 7¼d. the lb. what would 92746 lb. come to? Anſwer 2801l. 14s. 0½d.

35. What will 84907 lb. come to at 10½d. the lb.? Anſwer 3714l. 13s. 7½d.

36. At 11¾d. the yard, what will 69742 yards come to? Anſwer 3414l. 9s. 0½d.

VI.

37. What will 17690 lb. come to at ¼d. the lb.? Anſwer 18l. 8s. 6½d.

```
                lb.
    d.         17690
    ¼ is ¼    ------
          12 ) 4422½
              ------
        2|0 ) 36|8 6½
              ------
   Anſw. £. 18  8  6½
```

38. At ½d. the lb. what will 37940 lb. come to? Anſwer 79l. 0s. 10d.

39. How much muſt be paid for 987468 yards of cordage at ¾d. the yard? Anſwer 3085l. 16s. 9d.

40. At 1d. an ounce what muſt be paid for 4796482 ounces? Anſwer 19985l. 6s. 10d.

41. What will 5978462 lb. of any thing come to at 1¼d. the lb.? Anſwer 31137l. 16s. 5½d.

42. At 1½d. the yard what will 3945782 yards come to? Anſwer 24661l. 2s. 9d.

43. What will 9457842 ells come to at 1¾d. the ell? Anſwer 68963l. 8s. 7½d.

44. How much muſt be paid for 8474860 lb. at 2¼d. the lb.? Anſwer 79451l. 16s. 3d.

VII.

45. If 1 lb. coſt 2s. 6d. what will 7753 lb. coſt? Anſwer 969l. 2s. 6d.

lb.
s. d. 7753
2 6 is $\frac{1}{8}$
£. 969 | 2 6

46. What will 9654 yards come to at 3s. 4d. the yard? Anſwer 1609l.
47. How much will 500 buſhels of wheat come to at 6s. 8d. the buſhel? Anſwer 166l. 13s. 4d.
48. At 5s. the ounce of ſilver, what would 72864 oz. come to? Anſwer 18216l.
49. What muſt I pay for 92741 yards of linen at 4s. the yard? Anſwer 18548l. 4s.

VIII.

50. At 6s. the ell, how much will 3215 ells come to? Anſwer 964l. 10s.

ells
3215
s.
4 is $\frac{1}{5}$ 643
2 is $\frac{1}{2}$ 321 10
£. 964 10

51. If 1 lb. of tea coſt 7s. what will 4563 lb. amount to? Anſwer 1597l. 1s.
52. What will 7563 lb. come to if 1 lb. coſt 8s.? Anſwer 3025l. 4s.
53. At 13s. per cwt. how much will 401 cwt. come to? Anſwer 260l. 13s.
54. If 1 yard of cloth coſt 16s. how much is 269 yards worth? Anſwer 215l. 4s.
55. At 19s. per cwt. what will 2369 cwt. coſt? Anſwer 2250l. 11s.

IX.

56. What muſt be paid for 112 lb. of tea at 6s. 9d. the lb.? Anſwer 37l. 16s.

		lb.
		112
		6 9
d.		672
6 is	$\frac{1}{2}$	56
3 is	$\frac{1}{2}$	28
	2|0)	75|6

Anſw. £. 37 16

57. If 1 yard of cloth coſt 19s. 9d. what will 1400 yards coſt? Anſwer 1382l. 10s.

58. At 19s. 10$\frac{1}{2}$d. the cwt. what muſt be paid for 2740 cwt.? Anſwer 2722l. 17s. 6d.

59. What would 3874 acres of land come to at 19s. 11d. the acre? Anſwer 3857l. 17s. 2d.

60. If a gentleman is worth 19s. 11$\frac{3}{4}$d. every day, what will it amount to in 20 years, each year 365 days? Anſwer 7292l. 7s. 11d.

X.

61. If 1 lb. of ſilk coſt 3l. 15s. what will 5$\frac{3}{4}$ ounces coſt? Anſwer 1l. 16s. 11$\frac{7}{16}$d.

oz.			l.	s.	
			3	15	
4	is	$\frac{1}{4}$	0	18	9
1	is	$\frac{1}{4}$	0	4	8$\frac{1}{4}$
$\frac{1}{2}$	is	$\frac{1}{2}$	0	2	4$\frac{1}{8}$
$\frac{1}{4}$	is	$\frac{1}{2}$	0	1	2$\frac{1}{16}$
			£. 1	6	11$\frac{7}{16}$

62. What will 7$\frac{7}{8}$ ounces of ſpice come to, if 12s. 8d. is paid for 1 lb.? Anſwer 6s. 2$\frac{13}{16}$d.

63. How much would 21 lb. of ſugar coſt at the rate of 2l. 14s. 4d. per cwt.? Anſwer 10s. 2$\frac{1}{4}$d.

64. What will 14$\frac{3}{4}$ lb. come to if 1 cwt. coſt 27l. 10s. 6d.? Anſwer 3l. 12s. 5$\frac{221}{224}$d.

65. At 7s. 6d. the $\frac{1}{4}$ cwt. what will 11$\frac{3}{4}$ lb. come to? Anſwer 3s. 1$\frac{43}{56}$d.

66. What will 27½ lb. come to at 15s. 8d. the ¼ cwt.? Anſwer 15s. 4$\frac{9}{14}$d.

XI.

67. What muſt I pay for 245½ lb. at 3s. 6d. the lb.? Anſwer 42l. 19s. 3d.

		lb.			
		245½			
at			3	6 per lb.	
2s. is	$\frac{1}{10}$	24	10		
1s. is	½	12	5		
6d. is	½	6	2	6	
½lb. is	½		1	9	
£.	42	19	3		

68. At 16s. 4d. the cwt. what would 14 cwt. 3 qrs. come to? Anſwer 12l. 0s. 11d.
69. If 1 cwt. coſt 18s. 6½d. how much will 101 cwt. 1 qr. coſt? Anſwer 93l. 17s. 4⅛d.
70. What will 193 cwt. 3 qrs. coſt at 17s. 9½d. the cwt.? Anſwer 172l. 7s. 1⅝d.
71. At 16s. 5¼d. per cwt. what would 203 cwt. 3 qrs. come to? Anſwer 167l. 9s. 1$\frac{11}{16}$d.
72. What will 296¼ lb. of tea come to at 5s. 6d. the lb.? Anſwer 81l. 9s. 4½d.
73. If 1 cwt. coſt 18s. 9d. what would 106 cwt. 3 qrs. 14 lb. come to? Anſwer 100l. 3s. 10⅞d.
74. What would 2061 cwt. 2 qrs. 7 lb. coſt at 16s. 6d. the cwt.? Anſwer 1700l. 15s. 9⅜d.
75. At 9s. 4d. the cwt. what would 106 cwt. 3 qrs. 14lb. come to? Anſwer 49l. 17s. 6d.
76. How much will 26 cwt. 2 qrs. 7 lb. coſt, if 1 cwt. coſt 15s. 9d.? Anſwer 20l. 18s. 4$\frac{5}{16}$d.
77. If 1 cwt. coſt 21s. 6d. how much will 306 cwt. 3 qrs. 21 lb. come to? Anſwer 329l. 19s. 1⅞d.
78. If 1 ounce of ſilver coſt 5s. 6d. how much will 10lb. 6 dwts. 14 grains coſt? Anſwer 33l. 1s. 9$\frac{29}{40}$d.
79. What will 432 cwt. 2 qrs. 22 lb. come to at the rate of 18s. 6d. the cwt.? Anſwer 400l. 4s. 10$\frac{17}{28}$d.

80. How much will 951 cwt. 2 qrs. 27 lb. coſt at 11s. 3d. the cwt.? Anſwer 535l. 7s. $1\frac{5}{112}$d.

81. What will 506 cwt. 1 qr. 11 lb. come to at 13s. 7d. the cwt.? Anſwer 343l. 17s. $10\frac{85}{112}$d.

82. At 19s. 9d. the cwt. what will 109 cwt. 0 qrs. 15 lb. come to? Anſwer 107l. 15s. $4\frac{83}{112}$d.

83. If 1 cwt. coſt 15s. 2d. what will 753 cwt. 1 qr. 25lb. coſt? Anſwer 571l. 7s. $8\frac{1}{8}$d.

84. How much will 1095 cwt. 0 qrs. 5 lb. come to at 17s. 6d. per cwt.? Anſwer 958l. 3s. $3\frac{3}{8}$d.

85. What will 231 cwt. 0 qrs. 1 lb. coſt at the rate of 18s. 3d. the cwt? Anſwer 210l. 15s. $10\frac{107}{112}$d.

XII.

86. At 1l. 5s. 11d. the cwt. what will 499 cwt. 3 qrs. 25lb. come to? Anſwer 647l. 17s. $7\frac{75}{112}$d.

		cwt.	*qrs.*	*lb.*
		499	3	25
		1	5	11
		499		
5s.	is $\frac{1}{4}$	124	15	
6d.	is $\frac{1}{10}$	12	9	6
3d.	is $\frac{1}{2}$	6	4	9
2d.	is $\frac{1}{3}$	4	3	2
2qrs.	is $\frac{1}{2}$	0	12	$11\frac{1}{2}$
1qr.	is $\frac{1}{2}$	0	6	$5\frac{3}{4}$
14lb.	is $\frac{1}{2}$	0	3	$2\frac{7}{8}$
7lb.	is $\frac{1}{2}$	0	1	$7\frac{7}{16}$
4lb.	is $\frac{1}{7}$	0	0	$11\frac{3}{28}$
Anſw.	£.	647	17	$7\frac{75}{112}$

87. If 1 lb. of ſilk coſt 3l. 6s. 5d. what will 80 lb. 10 oz. coſt? Anſwer 267l. 14s. $10\frac{1}{8}$d.

88. What will 100 lb. 11 oz. of ſilver come to, if 1 lb. coſt 3l. 4s.? Anſwer 322l. 18s. 8d.

89. How much will 20 tuns, 19 cwt. 3 qrs. 14 lb. come to, if 1 tun coſt 19l. 19s. 6d.? Anſwer 419l. 7s. $0\frac{3}{80}$d.

90. At 25l. 10s. 9d. the tun what will 10 tun, 17 cwt. 3 qrs. come to? Anſwer 278l. 0s. $9\frac{39}{80}$d.

91. At 6s. 9d. the yard, what will 7 yards $3\frac{1}{2}$ qrs. come to? Anſwer 2l. 13s. $1\frac{7}{8}$d.

92. If 1 tun coſt 21l. 15s. 6d. what will 25 tuns, 15 cwt. 3 qrs. $14\frac{1}{2}$ lb. coſt? Anſwer 561l. 13s. $3\frac{681}{2240}$d.

93. What will 15 yards, $1\frac{1}{2}$ qr. of cloth coſt, if 1 piece containing 42 yards coſt 38l. 17s. $6\frac{1}{2}$d.? Anſwer 14l. 4s. $7\frac{141}{224}$d.

94. If 1 cwt. coſt 19s. $11\frac{3}{4}$d. what will 11 cwt. 3 qrs. $27\frac{1}{2}$ lb. come to? Anſwer 11l. 19s. $7\frac{119}{128}$d.

95. At 19l. 19s. $11\frac{3}{4}$d. the tun, what will 19 tuns, 19 cwt. 3 qrs. $27\frac{1}{2}$ lb. come to? Anſwer 399l. 19s. $5\frac{16641}{17920}$d.

CHAP. XVI.

TARE AND TRET.

TARE is an allowance made for the weight of the bag, box, cheſt, hogſhead, or whatever the goods are contained in, and is commonly allowed per cwt. according to agreement between the buyer and ſeller.

TRET is an allowance made to the buyers of goods for waſte, duſt, &c. and is always 4 lb. for every 104 lb. or the 26th part. Clough, or cloff, is another allowance ſometimes made for the turn of the ſcale, and is moſt commonly 2 lb. for every 3 cwt.

SECT. I.

1. Bought 12 cheſts of ſugar, weight, groſs, 84 cwt. 2 qrs. 14 lb. tare 30 lb. per cheſt, what is it neat? Anſwer 81 cwt. 1 qr. 18 lb.

	cwt.	*qrs.*	*lb.*
Groſs	84	2	14
Tare	3	0	24
Anſwer	81	1	18

```
      lb.
Tare  30 per
      12
     ———— 4)
28 ) 360 ( 12
     28    ————
     ——     3 0 24
     80
     56
     ——
     24
```

2. What is the neat weight of 40 hogſheads of tobacco, weighing, groſs, 227 cwt. 2 qrs. tare 76 lb. per hogſhead? Anſwer 200 cwt. 1 qr. 12 lb.

3. Sold 36 caſks of merchandizes, weighing, groſs, 172 cwt. 1 qr. 27 lb. tare of 24 of them 3 qrs. 6 lb. each, and the tare of the remainder 72 lb. each: let me know the neat weight. Anſ. 145 cwt. 1 qr. 27 lb.

4. What is the neat weight of 250 firkins of butter, weighing, groſs, 127 cwt. 2 qrs. 21 lb. tare 11 lb. per firkin? Anſwer 103 cwt. 0 qrs. 15 lb.

5. Bought 42 bales of Smyrna ſilk, weighing, groſs, 13020 lb. the tare of 18 bales of it was 16 lb. per bale, and the tare of the remainder 13 lb. per bale; how many lb. neat is it? Anſwer 12420.

6. What is the neat weight of 30 hogſheads. of ſugar, weight, groſs, 150 cwt. 1 qr. tare of 10 of them 2 qrs. 5 lb. each, tare of 8 at 49 lb. each, and the remainder at 69 lb. each: let me know the neat weight. Anſwer 133 cwt. 3 qrs. 18 lb.

II.

7. Bought 18 barrels of ſoap, weighing, each, 4 cwt. 2 qrs. 7 lb. tare 16 lb. per cwt. and at 2l. 2s. per cwt. what does it amount to? Anſwer 147l. 16s. 6d.

	cwt.	*qrs.*	*lb.*	
	4	2	7	
			6	
	27	1	14	
			3	
Groſs	82	0	14	
16 lb. is $\frac{1}{7}$	11	2	26	
Neat	70	1	16	
at	2	2		per cwt.
	140			
2s. is $\frac{1}{10}$	7			
1qr. is $\frac{1}{4}$	0	10	6	
16lb. is $\frac{1}{7}$	0	6	0	
Anſw. £.	147	16	6	

8. Sold 25 hogſheads of ſugar, weight, groſs, 7 cwt. 3 qrs. 21 lb. each, tare 14 lb. per cwt. and at 2l. 16s. 6d. per cwt. what does it amount to? Anſwer 490l. 10s. $3\frac{3}{64}$d.

9. What is the amount of 29 hogſheads of tobacco, weighing, groſs, 5 cwt. 1 qr. 21 lb. per hhd. tare 24 lb. per cwt. and at 3l. 19s. 9d. the cwt.? Anſwer 494l. 0s. $9\frac{165}{224}$d.

10. What will 22 hogſheads of raiſins come to, each weighing, groſs, 9 cwt. 2 qrs. 20 lb. tare per cwt. 18 lb. and at 37s. 4d. the cwt.? Anſwer 333l. 11s. $9\frac{1}{7}$d.

11. Bought 39 barrels of ſtarch, each weighing, groſs, 2 cwt. 3 qrs. 16 lb. tare 19 lb. per cwt. and at 44s. 4d. per cwt. what does it come to? Anſwer 207l. 13s. $2\frac{97}{112}$d.

12. Sold 47 bags of cocoa, weighing each, groſs, 3 cwt. 1 qr. 27 lb. tare 11 lb. per cwt. and at 6l. 17s. 10d. the cwt. what does it come to? Anſwer 1019l. 14s. $6\frac{4031}{6272}$d.

III.

13. Bought 12 caſks of merchandizes, weight, groſs, 306 cwt. 1 qr. 11 lb. tare 35 lb. per caſk, tret 4 lb. for every 104 lb. and at $15\frac{1}{2}$d. the lb. what does it come to? Anſwer 2104l. 12s. $2\frac{1}{4}$d.

	cwt.	*qrs.*	*lb.*
Groſs	306	1	11
Tare	3	3	0
4lb. is $\frac{1}{26}$	302	2	11
Tret	11	2	$15\frac{1}{2}$
Neat	290	3	$23\frac{1}{2}$
	4		
	1163		
	28		
	9307		
	2328		
	$32587\frac{1}{2}$		

32587$\frac{1}{2}$
at 1 3$\frac{1}{2}$

32587
3d. is $\frac{1}{4}$ 8146 9
$\frac{1}{2}$ is $\frac{1}{6}$ 1357 9$\frac{1}{2}$
$\frac{1}{2}$lb. is $\frac{1}{2}$ 0 7$\frac{3}{4}$

2|0) 4209|2 2$\frac{1}{4}$

£. 2104 12 2$\frac{1}{4}$

14. What muſt be paid for 19 bags of goods, weighing, groſs, 432 cwt. 1 qr. 24 lb. tare 17 lb. per bag, tret 4 lb. for every 104 lb. at 5s. 11$\frac{3}{4}$d. the lb.? Anſwer 13830l. 11s. 2$\frac{3}{8}$d.

15. What will 17 cheſts of ſugar come to, weighing, groſs, 120 cwt. 2 qrs. 18 lb. tare 176 lb. tret as uſual, and at 4l. 19s. 11$\frac{3}{4}$d. the cwt.? Anſwer 572l. 8s. 6$\frac{39}{448}$d.

16. Bought 148 caſks of raiſins, weighing, groſs, 441 cwt. 1 qr. 26 lb. tare 1 qr. 2 lb. per caſk, tret 4 lb. for every 104 lb. and at 38s. 4d. the cwt. what do they amount to? Anſwer 740l. 11s. 4$\frac{17}{28}$d.

17. What is the amount of 136 ſacks of ginger, weighing, groſs, 351 cwt. 0 qrs. 2 lb. tare 9 lb. per ſack, tret 4 lb. for every 104 lb. and at 5l. 2s. 8d. the cwt.? Anſwer 1678l. 12s. 11d.

18. A merchant has bought 4 hogſheads of copperas, weight as follows: N° 1, 10 cwt. 2 qrs. 4 lb, tare 3 qrs. 4 lb. N° 2, 11 cwt. 0 qrs. 10 lb. tare 3 qrs. 12 lb. N° 3, 12 cwt. 1 qr. 0 lb. tare 3 qrs. 18 lb. N° 4, 11 cwt. 2 qrs. 14 lb. tare 3 qrs. 20 lb. tret 4 lb. for every 104 lb. and at 9s. 4d. per cwt. how much does it come to? Anſwer 18l. 17s. 1d.

	cwt.	*qrs.*	*lb.*		*qrs.*	*lb.*
N^{o} 1, weight	10	2	4	Tare	3	4
N^{o} 2, weight	11	0	10	——	3	12
N^{o} 3, weight	12	1	0	——	3	18
N^{o} 4, weight	11	2	14	——	3	20
Groſs	45	2	0	Tare 3	1	26
Tare	3	1	26			
4lb. is $\frac{1}{28}$	42	0	2			
Tret	1	2	13			
Neat	40	1	17			
at		9	4	per cwt.		
	360					
4d. is $\frac{1}{3}$	13	4				
1qr. is $\frac{1}{4}$	2	4				
14lb. is $\frac{1}{2}$	1	2				
2 is $\frac{1}{7}$	0	2				
1 is $\frac{1}{2}$	0	1				
2|0)	37|7	1				
Anſw. £.	18	17	1			

19. Four caſks of raiſins weigh as follows: No. 1, 1 cwt. 3 qrs. 25 lb. tare 0 qrs. 27 lb. No. 2, 1 cwt. 3 qrs. 20 lb. tare 1 qr. 0 lb. No. 3, 2 cwt. 1 qr. 16 lb. tare 1 qr. 6 lb. No. 4, 1 cwt. 3 qrs. 23 lb. tare 1 qr. 1 lb. tret 4 lb. for every 104 lb. and at 37s. 4d. per cwt. what does it amount to? Anſ. 12l. 18s. 4d.

20. What will 3 bales of coffee come to, No. 1, weight 2 cwt. 3 qrs. 12 lb. tare 16 lb. No. 2, 3 cwt. 1 qr. 20 lb. tare 19 lb. No. 3, 3 cwt. 1 qr. 24 lb. tare 17 lb. tret 4 lb. for every 104 lb. and at 23l. 16s. per cwt.? Anſwer 212l. 10s.

21. A merchant has ſold 3 bags of pepper, viz. No. 1, weighing 3 cwt. 2 qrs. 0 lb. tare 1 qr. 7 lb. No. 2, 4 cwt. 1 qr. 7 lb. tare 1 qr. 10 lb. No. 3, 3 cwt. 3 qrs. 21 lb. tare 1 qr. 6 lb. tret 4 lb. for every 104 lb. and at 1s. $6\frac{3}{4}$d. per lb. I demand how much it will come to. Anſwer 90l. 16s. $4\frac{7}{8}$d.

CHAP. XVII.

EXCHANGE.

Sect. I.

Exchange is the drawing or receiving the money, weight, or meaſure, of one country, for the like value of another, by means of a writing or inſtrument called a bill of exchange.

EXAMPLES.

To reduce Engliſh money into Iriſh.

A merchant in Ireland draws a bill of exchange for 150l. Engliſh money, which he negociates to a banker at 5l. per cent. advance, how much Iriſh money is he to receive? Anſwer 157l. 10s.

	l.	l.	s.	
	150	150	0	Engliſh.
at	5 per cent.	7	10	Exchange.
	7|50	157	10	Iriſh.
	20			
	10|00			

270l. Engliſh at 7l. per cent. how much Iriſh? Anſwer 288l. 18s.

370l. Engliſh at 9l. per cent. how much Iriſh? Anſwer 403l. 6s.

510l. at 8l. per cent. what will it come to? Anſwer 550l. 16s.

955l. at 6l. per cent. what is it? Anſwer 1012l. 6s.

265l. at 4l. per cent. how much is it? Anſwer 275l 12s.

II.

190l. 17s. 10d. Engliſh money, at 5l. per cent. how much Iriſh is it? Anſwer 200l. 8s. $8\frac{7}{10}$d.

l. *s.* *d.*
190 17 10
at 5l. per cent.
9|54 9 2
20
10|89
12
10|70
10 { 70/100 | 7/10

l.	*s.*	*d.*	
190	17	10	Engliſh.
9	10	$10\frac{7}{10}$	Exchange
200	8	$8\frac{7}{10}$	Iriſh.

750l. 18s. 8d. at 7l. per cent. how much is it? Anſwer 803l. 9s. $11\frac{17}{25}$d.

901l. 1s. 11d. at 8l. per cent. Anſwer 973l. 3s. $8\frac{1}{25}$d.

300l. 15s. 6d. at 9l. per cent. Anſwer 327l. 16s. $10\frac{37}{50}$d.

199l. 19s. 11d. at 11l. per cent. Anſwer 221l. 19s. $10\frac{89}{100}$d.

999l. 19s. 9d. at 3l. per cent. Anſwer 1029l. 19s. $8\frac{91}{100}$d.

III.

280l. Engliſh at $6\frac{1}{2}$l. per cent. advance, how much is it? Anſwer 298l. 4s.

l.
280
$6\frac{1}{2}$
1680
$\frac{1}{2}$ is $\frac{1}{2}$ 140
18|20
20
4|00

l.	*s.*	
280	0	Engliſh.
18	4	Exchange.
298	4	Iriſh.

506l. at $5\frac{1}{2}$l. per cent. Anſwer 533l. 16s. $7\frac{1}{5}$d.

709l. at $7\frac{3}{4}$l. per cent. Anſwer 763l. 18s. $11\frac{2}{5}$d.

956l. at $9\frac{1}{8}$l. per cent. Anſwer 1043l. 4s. $8\frac{2}{5}$d.

1015l. at $7\frac{3}{4}$l. per cent. Anſwer 1093l. 13s. 3d.

250l. at $3\frac{7}{8}$l. per cent. Anſwer 259l. 13s. 9d.

763l. at $6\frac{1}{4}$l. per cent. Anſwer 810l. 13s. 9d.

IV.

309l. 15s. 4d. Engliſh, at $4\frac{1}{4}$l. per cent. advance, how much Iriſh is it? Anſwer 322l. 18s. $7\frac{31}{50}$d.

	l.	*s.*	*d.*
	309	15	4
at			$4\frac{1}{4}$l.
	1239	1	4
$\frac{1}{4}$ is $\frac{1}{4}$	77	8	10
	13|16	10	2
		20	
	3|30		
	12		
	3|62|31		
	100|50		

l.	*s.*	*d.*	
309	15	4	Engliſh.
13	3	$3\frac{31}{50}$	Exchange.
322	18	$7\frac{31}{50}$	Iriſh.

103l. 0s. 11d. at $5\frac{1}{3}$l. per cent. Anſw. 108l. 10s. $9\frac{74}{75}$d.
905l. 17s. 7d. at $5\frac{1}{4}$l. per cent. Anſw. 953l. 8s. $9\frac{31}{400}$d.
300l. 15s. at $7\frac{1}{2}$l. per cent. Anſwer 323l. 6s. $1\frac{1}{2}$d.
3014l. 16s. at $3\frac{1}{8}$l. per cent. Anſwer 3109l. 0s. 3d.
460l. 19s. 9d. at $5\frac{3}{4}$l. per cent. Anſwer 487l. 9s. $10\frac{251}{400}$d.
315l. 11s. at $5\frac{3}{8}$l. per cent. Anſwer 332l. 10s. $2\frac{110}{200}$d.
999l. 19s. at $3\frac{7}{8}$l. per cent. Anſw. 1038l. 13s. $11\frac{107}{200}$d.
680l. 15s. 5d. at $7\frac{5}{2}$l. per cent. Anſw. 732l. 13s. $7\frac{85}{100}$d.

V.

100l. 10s. $6\frac{1}{2}$d. Engliſh money, at $6\frac{1}{2}$l. per cent. advance, how much Iriſh money it is? Anſw. 107l. 1s. $2\frac{289}{400}$d.

	l.	*s.*	*d.*
	100	10	$6\frac{1}{2}$
at			$6\frac{1}{2}$l.
	603	3	3
$\frac{1}{2}$ is $\frac{1}{2}$	50	5	$3\frac{1}{4}$
	6|53	8	$6\frac{1}{4}$
	20		
	10|68		
	12		
	8|22$\frac{1}{4}$		

$$\frac{89}{4} \times \frac{100}{1}$$

$$\frac{89}{400}$$

	l.	*s.*	*d.*	
	100	10	$6\frac{1}{2}$	Engliſh.
	6	10	$8\frac{89}{400}$	Exchange
Anſ.	107	1	$2\frac{289}{400}$	Iriſh.

150l. 18s. $6\frac{3}{4}$d. at $5\frac{1}{2}$l. per cent. Anſw. 159l. 4s. $7\frac{1}{800}$d.
400l. 0s. $6\frac{1}{4}$d. at $7\frac{1}{8}$l. per cent. Anſw. 428l. 10s. $6\frac{89}{128}$d.
380l. 15s. $9\frac{1}{2}$d. at $5\frac{3}{4}$l. per cent. Anſw. 402l. 13s. $8\frac{317}{800}$d.
519l. 19s. $11\frac{3}{4}$d. at $6\frac{3}{4}$l. per cent. Anſwer 555l. 1s. $11\frac{1173}{1600}$d.
100l. 10s. $6\frac{1}{4}$d. at $5\frac{1}{8}$l. per cent. Anſw. 105l. 13s. $6\frac{461}{640}$d.

VI.

To reduce Iriſh money into Engliſh.

A merchant in London has a bill of exchange for 100l. Iriſh money, which he ſells or negociates at 5l. per cent. that is 105l. in Ireland is worth 100l. in England: I demand how much Engliſh money he is to receive. Anſwer 95l. 4s. $9\frac{1}{7}$d.

If

Iriſh	*Engliſh*	*Iriſh*
l.	*l.*	*l.*
If 105 ——	100 ——	100

100

$l.\ s.\ d.$

105) 10000 (95 4 $9\frac{1}{7}$

945

550

525

25

20

$s.\ d.$

105) 500 (4 $9\frac{1}{7}$

420

80

12

$d.$

105) 960 ($9\frac{1}{7}$

945

$15\left\{\frac{15}{105}\middle|\frac{1}{7}\right.$

160l. 10s. Iriſh, at 7l. per cent. how much Engliſh? Anſwer 150l.

545l. 14s. at 7l. per cent. how much Engliſh? Anſ. 510l.

1093l. 13s. 3d. at $7\frac{3}{4}$l. per cent. Anſwer 1015l.

323l. 6s. $1\frac{1}{2}$d. at $7\frac{1}{2}$l. per cent. Anſwer 300l. 15s.

62l. 2s. at $3\frac{1}{2}$l. per cent. Anſwer 60l.

100l. at $5\frac{1}{8}$l. per cent. Anſwer 95l. 2s. $5\frac{811}{841}$d.

314l. 5s. at $4\frac{3}{4}$l. per cent. Anſwer 300l.

259l. 13s. 9d. at $3\frac{7}{8}$l. per cent. Anſwer 250l.

VII.

To reduce ſterling money into Flemiſh.

A merchant at Antwerp has a bill of exchange for 100l. payable in London, which he negociates at 33s. 4d. Flemiſh,

Flemiſh for 1l. ſterling: I demand how much Flemiſh money he is to receive. Anſwer 166l. 13s. 4d. Flemiſh.

l. s. l.
If 1 —— $33\frac{1}{3}$ —— 100
3
—   100
3   100
3) 10000
2|0) 333|3 4
£. 166 13 4 Anſwer.

How many pounds Flemiſh is 279l. 8s. ſterling at 33s. 4d. Flemiſh per pound ſterling? Anſ. 465l. 13s. 4d.

In 150l. 10s. ſterling, at 33s. 6d. Flemiſh per pound ſterling, how many pounds Flemiſh? Anſwer 252l. 1s. 9d.

How many pounds Flemiſh are in 169l. 10s. 11d. ſterling at 33s. 3d. Flemiſh per pound ſterling? Anſwer 281l. 17s. $4\frac{63}{80}$d.

VIII.

To reduce Flemiſh money into ſterling.

If 1l. ſterling is 33s. 4d. Flemiſh, how many pounds ſterling are then in 166l. 13s. 4d. Flemiſh? Anſwer 100l.

s. d. l. l. s. d.
If 33 4 —— 1 —— 166 13 4
12   20
400   3333
12
4|00) 400|00
£. 100 Anſwer.

How many pounds ſterling are equal to 465l. 13s. 4d. Flemiſh, at 33s. 4d. Flemiſh per pound ſterling? Anſwer 279l. 8s.

In 252l. 1s. 9d. Flemiſh, at 33s. 6d. how many pounds ſterling? Anſwer 150l. 10s.

How many gilders are in 1409l. ſterling, if one pound ſterling is 33s. 8d. Flemiſh? Anſwer 14230 gilders, 18 ſtivers.

How many pounds ſterling are in 199l. 19s. 11d. Flemiſh, at $33\frac{3}{8}$s. per pound ſterling? Anſwer 119l. 16s. $11\frac{357}{831}$d.

IX.

To reduce gilders into ſterling money.

How many pounds ſterling are equal to 1680 gilders at 33s. 3d. Flemiſh per pound ſterling? Anſwer 168l. 8s. $5\frac{21}{399}$d.

```
      s.  d.       l.         gild.
   If 33  3 ——— 1 ——— 1680
      12                        20
     ———                      ————
     399                      33600
                                  2
                            ——————      l.
                     399 ) 67200 ( 168
                           399
                           ———
                           2730
                           2394
                           ————
                            3360
                            3192
                            ————
                             168
                              20
                            ————     s.
                  399 ) 3360 ( 8
                        3192
                        ————
                         168
                          12
                        ————     d.
                  399 ( 2016 ( 5
                        1995
                        ————
                          21
                         ———
                         399
```

In 2080 gilders, 15 ſtivers, at 34s. 9d. Flemiſh per pound ſterling, how many pounds ſterling is it? Anſwer 199l. 11s. $10\frac{66}{417}$d.

At 33s. 11d. Flemiſh per pound ſterling, I demand how many pounds ſterling are then in 6048 gilders. Anſwer 594l. 7s. $11\frac{215}{407}$d.

2048 gilders, 15 ſtivers, at 34s. 5d. Flemiſh per pound ſterling, how many pounds ſterling is it? Anſwer 198l. 8s. $6\frac{114}{413}$d.

How many pounds ſterling are in 10909 gilders, 19 ſtivers, at 34s. 7d. Flemiſh per pound ſterling? Anſwer 1051l. 11s. $2\frac{310}{415}$d.

In 1000 gilders, at $33\frac{1}{3}$s. Flemiſh per pound ſterling, how many pounds ſterling is it? Anſwer 100l.

X.

To reduce pounds ſterling into gilders.

How many gilders are equal to 100l. ſterling at 33s. 4d. Flemiſh per pound ſterling? Anſwer 1000 gild.

l. s. d. l.
If 1 —— 33 4 —— 100
12
———
400
100
———
2) 40000
———
2|0) 2000|0
———

Anſw. 1000 gilders.

How many gilders are in 1409l. ſterling, if 1l. ſterling is 33s. 8d. Flemiſh? Anſwer 14230 gilders, 18 ſtivers.

In 100l. 10s. ſterling, at 33s. 9d. Flemiſh per pound ſterling, how many gilders is it? Anſwer 1017 gilders, $11\frac{1}{4}$ ſtivers.

Tell me how many gilders are in 1941l. 15s. 6d. ſterling, the exchange at 33s. 11d. Flemiſh per pound ſterling. Anſwer 19757 gilders, 11 ſtivers, $3\frac{96}{240}$ pennings.

At 34s. 5d. Flemiſh per pound ſterling, I would know how many gilders are then in 1597l. 9s. 11d. ſterling. Anſwer 16494 gilders, 2 ſtivers, 14$\frac{56}{240}$ pennings.

XI.

To reduce French crowns into pounds ſterling.

A merchant is remitted a bill of exchange from Paris upon London, or any other town in England or Ireland, for 1800 crowns, at 32½d. ſterling per crown: how many pounds ſterling does it come to? Anſ. 243l. 15s.

```
            crowns.
             1800
          at  32½d.
          ---------
             3600
             5400
  ½ is ½      900
          ---------
     12 )   58500
          ---------
    2|0 )   487|5
          ---------
        £. 243  15 Anſ.
```

How many pounds ſterling are equal to 1000 French crowns, at 33¼d. ſterling per crown? Anſwer 138l. 10s. 10d.

In 1263½ crowns at 32½d. ſterling per crown, how many pounds ſterling is it? Anſwer 171l. 1s. 11¾d.

How many pounds ſterling are equal to 1037¾ crowns, at 33d. ſterling for every crown? Anſ. 142l. 13s. 9¾d.

In 1976 crowns, 1 livre, 4 ſols, at 32½d. ſterling per crown, how many pounds ſterling is it? Anſwer 267l. 12s. 9d.

At 33¾d. ſterling per crown, how many pounds ſterling are then in 1000 crowns? Anſwer 140l. 12s. 6d.

How many pounds ſterling are in 2822 crowns, 2 livres, 8 ſols, 4 deniers, at 36d. ſterling per crown? Anſwer 423l. 8s. 5d.

XII.

To reduce pounds ſterling into French crowns.

A bill being drawn in London, or any other town of England or Ireland, upon Paris or any other part of France, for 243l. 15s. at 32½d. per crown; I deſire to know how many crowns or livres are to be paid for that bill. Anſwer 1800 crowns, or 5400 livres.

Note. A crown is 3 livres, a livre is 20 ſols, and a ſol is 12 deniers.

```
     d.      crown     l.   s.
If 32½ ——— 1 ——— 243  15
   ———             20
   65             ————
                  4875
                    12
                  ————
                 58500
                     2
                 —————
         65 ) 117000 ( 1800 crowns
              65          3
              ———       ————
              520       5400 livres
              520       ————
              ———
               00
```

How many crowns are equal to 138l. 10s. 10d. ſterling, at 33¼d. per crown? Anſwer 1000 crowns, or 3000 livres.

In 171l. 1s. 11¾d. how many crowns does it make, at 32½d. per crown? Anſwer 1263½ crowns, or 3790 livres, 10 ſols.

How many crowns are in 142l. 13s. 9¾d. at 33d. per crown? Anſ. 1037¾ crowns, or 3113 livres, 5 ſols.

At 32½d. per crown, how many crowns are then in 267l. 12s. 9d.? Anſwer 1976 crowns, 1 livre, 4 ſols.

In 140l. 12s. 6d. how many crowns, at 33¾d. per crown? Anſwer 1000 crowns.

How many crowns Tournois are equal to 423l. 8s. 5d. exchange, at 36d. per crown? Anſwer 2822 crowns, 2 livres, 8 ſols, 4 deniers.

XIII. To

XIII.

To reduce Hamburgh money into pounds ſterling.

A bill being drawn at Hamburgh, upon London or any other town in England or Ireland for 3083 marks, 12⅔ ſtiver lubs, at 32s. 4d. groſs for the pound ſterling; I deſire to know how much Engliſh money it will come to. Anſwer 254l. 6s. 8d.

```
     s. d.      l.      marks  ſtiv.
  If 32  4 ——— 1 ——— 3083.   12⅔
     12 . Groſs in a mark 32  .  2
     ——                  ————  ———
    388 groſs            6166   25⅓
                        9249   ———
                        ————
                       98656
                          25⅓
                       ————         l.  s. d.
              388 ) 98681⅓ ( 254 6 8
                    776
                    ————
                    2108
                    1940
                    ————
                     1681
                     1552
                     ————
                      129
                       20
                     ————
                     2580
                        6
                     ————          s. d.
              388 ) 2586 ( 6 8
                    2328
                    ————
                     258
                      12
                    ————
                    3096
                       8
                    ————          d.
              388 ) 3104 ( 8
                    3104
```

Note. The remaining $129\frac{1}{3}$ multiply by 20, and the product divide again by 388, and there will come 6s. then there will remain $258\frac{2}{3}$, which multiply by twelve, and divide the product again by 388, and there will come 8d.

In 2443 marks, $9\frac{1}{2}$ ſtiver lups, how many pounds, at 32s 6d. groſs per pound? Anſwer 200l. 10s.

In 6763 marks, $14\frac{3}{8}$ ſtiver lups, at 32s. 9d. groſs per pound, how many pounds ſterling does it make? Anſwer 550l. 15s.

In 12093 marks, 12 ſtiver lups, at 32s. 3d. groſs per pound ſterling, how many pounds is it? Anſ. 1000l.

How many pounds ſterling are in 4211 marks, $1\frac{3}{8}$ ſtiver lup, at 32s. 6d. groſs per pound? Anſ. 345l. 10s. 6d.

XIV.

To reduce pounds ſterling into Hamburgh money.

A bill of $254\frac{1}{3}$l. ſterling being drawn at London or any other town in England or Ireland, upon Hamburgh, at $32\frac{1}{3}$s. groſs per pound ſterling; I deſire to know how many mark lups are to be paid for that bill. Anſwer 3083 mark lups, $12\frac{2}{3}$ ſtiver lups.

l. *s.* *d.* *l.*
If 1 —— 32 4 —— $254\frac{1}{3}$
12 388
388 2032
2032
762
$129\frac{1}{3}$
32) $98681\frac{1}{3}$ (3083
96
268
256
121
96
2) $25\frac{1}{3}$
$12\frac{2}{3}$

Note. The remaining 25$\frac{1}{3}$ groſs, divide by 2, and they will be 12$\frac{2}{3}$ ſtivers.

How many mark lups are equal to 200l. 10s. at 32$\frac{1}{2}$ ſhillings groſs per pound ſterling? Anſ. 2443 mark, 9$\frac{1}{2}$ ſtiver lups.

How many mark lups are in 550l. 15s. ſterling, at 32s. 9d. groſs per pound ſterling? Anſwer 6763 mark, 14$\frac{3}{8}$ ſtiver lups.

In 1000l. ſterling, at 32s. 3d. groſs per pound, how many mark lups? Anſwer 12093 mark, 12 ſtiver lups.

In 345l. 10s. 6d. ſterling, at 32s. 6d. groſs per pound ſterling, how many mark lups? Anſwer 4211 mark, 1$\frac{3}{8}$ ſtiver lups.

XV.

To reduce Portugal money into pounds ſterling.

A merchant has a bill of exchange for 850 millres, 500 res, payable in Liſbon, which bill he negociates or ſells at 5s. 4d. per millre: I demand how many pounds he is to receive. Anſwer 226l. 16s.

	millr.	*res.*
	850	500
at	5	4
d.	4250	
4 is $\frac{1}{3}$	283	4
500 *res* is $\frac{1}{2}$ *m. r.*	2	8
2|0)	453|6	0
£.	226 16	0 Anſ.

How many pounds ſterling are in 1000 millres, 000 res, at 5s. 6d. per millre? Anſwer 275l.

At 5s. 6$\frac{3}{4}$d. per millre, how many pounds will 2060 millres, 380 res make? Anſwer 573l. 0s. 10$\frac{292}{800}$d.

In 2000 millres, 000 res, at 5s. 8$\frac{1}{2}$d. per millre, how much is it? Anſwer 570l. 16s. 8d.

How many pounds are in 1056 millres, 999 res, at 5s. 4$\frac{1}{4}$d. per millre? Anſwer 282l. 19s. 4$\frac{743}{1000}$d.

XVI.

To reduce ſterling money into Portugal money.

How many millres are equal to 226l. 16s. the exchange at 5s. 4d. per millre? Anſwer 850 m. 500 res.

s. d. — res. — l. s.
If 5 4 —— 1000 —— 226 16
12 — 20
64 — 4536
12
54432
1000
(1|000)
64) 54432000 (850|500
512 — 850 500 Anſ.
323
320
320
320
00

In 275l. at 5s. 6d. per millre, how many millres? Anſ. 1000 millres, 000 res.

How many millres are in 570l. 16s. 8d. the exchange at 5s. 8½ per millre? Anſwer 2000 millres.

At 5s. 10d. per millre, how many millres are then in 106l. 5s. 6¼? Anſwer 364 millres, 375 res.

XVII.

1. When the par of exchange between England and Holland is at 33s. 4d. Flemiſh per pound ſterling, how much is then a gilder of 20 ſtivers worth in London? Anſwer 2s.

s. Fl. — s. ſterl. — ſtiv.
If 33⅓ —— 20 —— 20
3
100 — 60
6 — 20
600 ſtivers. — s.
600) 1200 (2
1200

Or thus.

s. d. — *s. ſter.* — *ſtiv.*
If 33 4 ——— 20 ——— 20
12 — 2
400 groots — 40 groots
20
s.
400) 800 (2 Anſ.
800

Note. Par in trade or commerce, is a kind of equality among monies, or how much a perſon muſt give of one kind of ſpecies, to render it juſt equivalent to a certain quantity of another. The par differs from the courſe of exchange in this, that the par of exchange ſhews what one nation ſhould allow another in exchange, which is certain and fixed; but the courſe of exchange ſhews what they will allow in exchange, which is uncertain, ſometimes more and ſometimes leſs.

2. What is the par of exchange between England and Holland, that is, how many ſhillings Flemiſh are equal to 20 ſhillings ſterling, when a gilder, or 20 ſtivers, is equal to 2 ſhillings ſterling? Anſwer $33\frac{1}{3}$ ſhillings Flemiſh.

3. When the par of exchange between France and England was at 54 pence ſterling per crown, of 3 livres Tournois, what ought the par to be when that crown is raiſed in France to 5 livres? Anſw. $32\frac{2}{5}$d.

4. What is the par of exchange between England and Ireland, if a guinea paſſes in England for 21 ſhillings, and a crown for 5 ſhillings, and in Ireland the ſame guinea goes for 22s. 9d. and the crown for 5s. 5d.? Anſwer $8\frac{1}{3}$ per cent.

5. If for 150l. Engliſh money there is paid 160l. 10s. Iriſh, what is the exchange? Anſwer 7 per cent.

6. Which is better, for a merchant in Ireland to have crowns ſent him from England, or to draw at 7 per cent. advance, when a crown is 5s. in England and

5s. 5d. in Ireland? Anſwer, it is better to have crowns ſent him by $1\frac{1}{3}$ per cent.

7. When the exchange from London to Liſbon is at $5\frac{1}{2}$s. per millre, and the exchange between London and Corke is at $8\frac{3}{4}$ per cent. advance for Corke, how much is then a millre worth at Corke? Anſ. 5s. $11\frac{31}{40}$d.

8. If for $1037\frac{3}{4}$ French crowns there is paid in London 142l. 13s. $9\frac{3}{4}$d. what is the exchange? Anſwer 33d. per crown.

9. What is the exchange, if for 314l. 5s. Iriſh money there is paid in England 300l.? Anſ. $4\frac{3}{4}$ per cent.

10. When the exchange between London and Rotterdam is $35\frac{3}{4}$s. Flemiſh per pound ſterling, how much is then an Engliſh crown of 5s. worth at Rotterdam? Anſwer $53\frac{5}{8}$ ſtivers.

11. If for 150l. 10s. ſterling, there is paid 252l. 1s. 9d. Flemiſh, what is the exchange? Anſwer $33\frac{1}{2}$s. Flemiſh per pound ſterling.

12. At how much is the exchange, when for 60l. Engliſh money there is paid 62l. 2s. Iriſh? Anſwer $3\frac{1}{2}$ per cent.

13. If a French crown is worth at Rotterdam 2 gilders, 8 ſtivers, how much is that crown worth at London, when the exchange is at 35s. Flemiſh per pound ſterling? Anſwer $4\frac{4}{7}$s.

14. If for 850 millres, 500 res, there is paid in London 226l. 16s. how much is then the exchange? Anſwer 5s. 4d. per millre.

15. How much is the exchange between Amſterdam and London, if a French crown is worth at London $4\frac{4}{7}$s. ſterling, and at Amſterdam 48 ſtivers? Anſwer 35s. Flemiſh per pound ſterling.

16. When an Engliſh ſhilling is worth 11 ſtivers at Rotterdam, how much is then the exchange? Anſwer $36\frac{2}{3}$s. Flemiſh per pound ſterling.

17. When a guinea at London is 21s. and at Rotterdam 11 gilders, 11 ſtivers; I want to know whether it is better to ſend guineas to Rotterdam, or remit bills of exchange, at $36\frac{2}{3}$s. Flemiſh per pound. Anſwer, it is equal.

18. What is the exchange between London and Hamburgh, when for 2443 mark, $9\frac{1}{2}$ ſtiver lups, there is paid in London 200l. 10s.? Anſwer 32s. 6d. groſs lups per pound ſterling.

XVIII.

19. What is a gilder worth at Corke, if the exchange between London and Rotterdam is at 35s. Flemiſh per pound ſterling, and the exchange from Corke to London at 9 per cent. advance? Anſwer $2\frac{8}{105}$s.

Note. A ſhilling Flemiſh is 6 ſtivers.

s. — s. — *ſtiv.*

If 35 —— 20 —— 20

12 … 2

420 … 40

20

42|0) 80|0 ($1\frac{19}{21}$

42

$2 \left\{ \frac{38|19}{42|21} \right.$

l. Lon. — *l. Corke.* — *s. Lon.*

If 100 —— 109 —— $1\frac{19}{21}$

20 … 20 … 40

2000 … 2180

21 … 40

2000 420|00) 872|00 ($2\frac{8}{105}$ s. Anſ.

4000 … 840

42000

$4 \left\{ \frac{32|8}{420|105} \right.$

Or thus:

Imagine two columns, and in the firſt put any one of the given numbers, and againſt it in the ſecond column, put its relative; then put in the firſt column that which is of the ſame name with the laſt of the ſecond column, and in the ſecond column put its relative, and ſo on, until the laſt in the ſecond column is of the ſame name with the firſt in the firſt column: for the number ſought put a (*), then multiply all the numbers which ſtand under one another continually together, and divide the product of the column which hath no (*) by the product of the other column, and the quotient is the anſwer required.

EXAMPLE.

ſtiv.		
35s. Flemiſh, or 210	} ..... {	1l. London.
London 100l.		109l. Corke.
How much at Corke *		20 ſtivers Rotterdam.

21000 2180

20

$$210|00\ )\ 436|00\ (\ 2\tfrac{8}{105}\ \text{s. Anſ.}$$

420

$$2\left\{\frac{16|8}{210|105}\right.$$

Or thus:

London 1l.	} ..... {	210 ſtiv. Rotterdam
Stivers Rotterdam 20		* How many l. Corke.
Corke 109l.		100l. London.

2180 21000

20

$$210|00\ )\ 436|00\ (\ 2\tfrac{8}{105}\ \text{s. Anſ.}$$

420

$$2\left\{\frac{16|8}{210|105}\right.$$

Or thus:

How many s. Corke * } ..... { 20 ſtivers Rotterdam.
Stivers Rotterdam 210 } ..... { 1l. London.
London 100l. } ..... { 109l. Corke.

21000 2180
20

$210|00\ )\ 436|00\ (\ 2\tfrac{8}{105}$ s. Anſ.
420

$2\left\{\frac{16|8}{210|105}\right.$

Or thus:

£. London 100 } ..... { 109l. Corke.
How many s. Corke * } ..... { 20 ſtivers Rotterdam.
Stiv. Rotterdam 210 } ..... { 1l. London.

21000 2180
20

$210|00\ )\ 436|00\ (\ 2\tfrac{8}{105}$ s. Anſ.
420

$2.\left\{\frac{16|8}{210|105}\right.$

Or thus:

Corke 109l. } ..... { 100l. London.
London 1l. } ..... { 210 ſtiv. Rotterdam.
Stiv. Rotterdam 20 } ..... { *How many s. Corke.

2180 21000
20

$210|00\ )\ 436|00\ (\ 2\tfrac{8}{105}$ s. Anſ.
420

$2\left\{\frac{16|8}{210|105}\right.$

20. When the exchange between London and Corke is at 6 per cent advance for Corke, and the exchange between London and Hamburgh at 33s. 4d. groſs per pound ſterling, what is then a mark lup worth at Corke? Anſwer $20\frac{44}{125}$d.

21. How much would a French livre of 20 ſols be worth at Corke, when the exchange between London and Paris, or any other part of France, is at 34d. ſterling per crown of 3 livres, and the exchange between London and Corke at 5 per cent. advance for Corke? Anſwer $11\frac{9}{10}$d.

22. When 105l. at Corke is worth 100l. at London, and the exchange between London and Paris at 36d. per crown of 3 livres or 60 ſols, how much is then 12d. of Corke worth at Paris? Anſwer $19\frac{1}{21}$ ſols.

23. What is a gilder of 20 ſtivers worth at Corke, when the exchange between London and Rotterdam is at 33s. 4d. Flemiſh per pound ſterling, and the exchange between London and Corke at $8\frac{1}{3}$ per cent. advance for Corke? Anſwer 26d.

24. When the exchange between London and Corke is at $8\frac{3}{4}$ per cent. advance for Corke, and the exchange between London and Rotterdam is at 33s. 4d. Flemiſh per pound, how much is then 12d. of Corke worth at Rotterdam? Anſwer $9\frac{17}{87}$ ſtivers.

25. At how much ought the exchange to be between London and Corke, to make the money at a par, when a crown in London is 5 ſhillings, and the ſame crown at Corke is 5s. 5d.? Anſ. $8\frac{1}{3}$ per cent.

26. A merchant in Liſbon owes a merchant in Corke 1000 millres, 000 res: I want to know which is more advantageous to the merchant in Corke, whether the merchant in Liſbon ſends him moidores of 4000 res a-piece, which paſs in Corke for 29s. 3d. a-piece, or to have the debt remitted to London at 6s. 6d. per millre, and from London remitted to Corke at 8 per cent. advance for Corke. Anſwer, it is more advantageous to have moidores ſent him by $4\frac{1}{6}$ per cent.

27. A merchant at Corke ſends to Bourdeaux in France 100 barrels of beef, which ſtand him, clear of all charges at Bourdeaux, 22s. per barrel; I deſire to know

for how many livres they muſt be ſold a barrel at Bourdeaux, to gain 20 per cent. if the money can be remitted to London at 36d. ſterling per crown, and from London to Corke at 8 per cent. advance for Corke. Anſwer for 24 livres, 8 ſols, 10⅔ deniers.

XIX.

28. If 4 lb. of A. are as heavy as 3 lb. of B. and 5 lb. of B. as 4 lb. of C. and 6 lb. of C. as 5 lb. of D. how many lb. of D. are then as heavy as 240 lb. of A.? Anſwer 120 lb. of D.

A.	4		3	B.
B.	5		4	C.
C.	6	………	5	D.
How many of D.	*		240	A.

120   120) 14400 (120 lb. of D.
120
240
240
0

Note. All the numbers that are the ſame in the firſt column with thoſe in the ſecond, may be cancelled in both, which will oftentimes ſave much labour.

29. If 112 lb. of pewter at London coſt 3l. 15s. 0d. how many ſtivers will 1 lb. coſt at Rotterdam, if 100 lb. at Rotterdam are equal to 110 lb. at London, and the exchange at 35s. Flemiſh per pound ſterling? Anſwer $7\frac{1545}{2240}$ ſtivers.

30. If 3 yards of cloth coſt as much as 3¾ yards of ratteen, and 4½ yards of ratteen are worth 5 yards of drugget, how many yards of drugget are then worth 27 yards of cloth? Anſwer 37½ yards.

31. If 3 yards in London are equal to 4 ells in Holland, and 50 ells in Holland coſt 26l. Flemiſh, how many pounds Flemiſh will 40 yards in London come to? Anſwer $27\frac{11}{15}$l. Flemiſh.

32. What will 1 lb. of pepper coſt if 3 pound of cloves coſt as much as 6 lb. of pepper, and 2½ lb. of cinna-

mon coſt as much as 4 lb. of cloves, and 3 lb. of cinnamon coſt 8s.? Anſwer 10d.

XX.

33. If 102 lb. at Rotterdam is 112 lb. at Corke, and 1 tun of tallow coſt at Corke 27l. and the exchange from Corke to London is 8l. per cent. advance, and the exchange from London to Rotterdam at 34s. Flemiſh per pound ſterling: I demand how many gilders 100 lb. of the ſaid tallow will ſtand in at Rotterdam, without freight or any other charges. Anſwer 12 gilders, 10 ſtivers.

EXAMPLE.

lb. Rotterdam	102	112 lb. Corke.
lb. tallow	2240	27l. Corke.
£. Corke	18	100l. London.
£. London	1	34s. Flemiſh.
What will *		100 lb. Rotterdam.

2467584|0) 1028160000|0 (41 ſhill.
9870336

4112640
2467584

1645056

Over 1645056
6

2467584) 9870336 (4
9870336

41 ſhillings.
6

2|0) 24|6 ſtiv.

12 6
Add 4

Gild. 12 10 Anſw.

34. A merchant in Corke has bought for his correſpondent in Liſbon a tun of butter, which coſt, with all charges

on board, 25l.: now if 100 lb. of Corke is equal to 105 lb. at Liſbon, and the exchange from London to Liſbon is at 6s. 3d. per millre, and the exchange from London to Corke at 5l. per cent. advance for Corke: I deſire to know how many res the ſaid butter will ſtand in at Liſbon, without freight or other charges there. Anſwer 76 millres, $190\frac{10}{21}$ res.

CHAP. XVIII.

THE DOUBLE RULE OF THREE DIRECT.

SECT. I.

This rule has its name from having five numbers given, to find a ſixth in proportion thereunto, of which five numbers there are three of ſuppoſition, and two of demand, and is reſolved thus:

1. If 450l. in $8\frac{1}{3}$ months gain 25l. at how much per cent. is that per ann.? Anſwer 8l. per cent.

$$\begin{array}{ccccc} 450l. & & l. & & 100l. \\ & > & 25 & < & \\ \text{Months } 8\frac{1}{3} & & & & 12 \text{ Months.} \\ \underline{} & & & & \\ 25 & & & & \end{array}$$

$$\begin{array}{rrr} 11250 & & 1200 \\ & & \underline{25} \\ & & 6000 \\ & & \underline{2400} \\ & & 30000 \\ & & \underline{3} \\ & & l. \\ 11250\ ) & 90000 & (\ 8 \text{ Anſ.} \\ & \underline{90000} & \end{array}$$

Or thus:

months *l.* *months*

If $8\frac{1}{3}$ —— 25 —— 12

3 36 3

25 150 36

75

25) 900

36

l. *l.* *l.*

If 450 —— 36 —— 100

100

450) 3600 (8l. per cent. Anſ.

3600

2. If 240l. in 16 months gain 64l. how much will 60l. gain in 6 months? Anſwer 6l.
3. If 60l. gain in 6 months 6l. what will 240l. gain in 16 months? Anſwer 64l.
4. A merchant agrees with a carrier to carry 15 cwt. of goods 40 miles, for 10 quarter guineas; how much muſt one pay in proportion to have 6 cwt. carried 32 miles? Anſwer 16s. $9\frac{3}{5}$d.
5. If 20 cwt. is to be carried 50 miles for 5l. how much will 40 cwt. coſt if it be carried 100 miles? Anſwer 20l.
6. How much will $32\frac{2}{5}$l. gain in 4 months and 15 days (each month 30 days), if 324l. gain in 14 months 35l.? Anſwer 1l. 2s. 6d.
7. If $32\frac{2}{5}$l. get $1\frac{1}{8}$l. in $4\frac{1}{2}$ months, how much can 324l. get in 14 months? Anſwer 35l.
8. If 1 lb. of thread makes 3 yards of linen of $1\frac{1}{4}$ yard broad, how many lb. of thread would be wanted to make a piece of linen of 45 yards long and 1 yard broad? Anſwer 12 lb.

9. If 3 lb. of worſted makes 10 yards of ſtuff, of 1$\frac{1}{2}$ yard broad, how many lb. would be wanted to make a piece of 100 yards long, and 1$\frac{1}{4}$ yard broad? Anſwer 25 lb.

10. If $\frac{1}{2}$ a yard of cloth of 1$\frac{3}{4}$ yard broad, is made with $\frac{1}{4}$ lb. of yarn, how many lb. will be wanted to make a piece of cloth of 80 yards long, and $\frac{3}{4}$ yard broad? Anſwer 17$\frac{1}{7}$ lb.

11. If 15$\frac{1}{8}$ lb. of worſted makes 15$\frac{3}{4}$ yards of cloth, of 1$\frac{1}{2}$ yard broad, how many lb. of worſted will be wanted to make a piece of cloth of 75$\frac{1}{2}$ yards long, and 1$\frac{1}{4}$ yard broad? Anſwer 60$\frac{635}{1512}$.

12. If 12 men in 8 days gain 8l. 8s. what will 28 men gain in 15 days? Anſwer 36l. 15s.

13. What will 12 men gain in 8 days, if 28 men in 15 days gain 36l. 15s.? Anſwer 8$\frac{2}{5}$l.

14. If I had a bond for 876l. 14s. 10d. payable in 79 days, and agreed to receive the ſaid money immediately with 6 per cent. per ann. abatement; I demand how much I am to receive. Anſwer 865l. 7s. 1$\frac{4082}{9125}$d.

II.

15. If 3 maſters who have each 8 apprentices, in 5 weeks, each week 6 days, earn 36l. how much will 5 maſters, who have each 10 apprentices, earn in 8 weeks, each week 5$\frac{1}{2}$ days, their daily wages being equal with the former? Anſwer 110l.

EXAMPLE.

Maſters	3	*l.*	5 Maſters.
Apprentices	8	36	10 Apprentices.
Weeks	5		8 Weeks.
Days	6		$5\frac{1}{2}$ Days.

720   4400

2   36

1440   26400

13200

l.

1440) 158400 (110

1440

1440

1440

0

16. If a ciſtern of 16 feet long, 7 feet broad, and 15 feet deep, coſt 9l. 6s. 8d. I demand how much in proportion another ciſtern would ſtand in of $17\frac{1}{2}$ feet long, $10\frac{1}{2}$ feet broad, and 13 feet deep. Anſwer 13l. 5s. 5d.
17. How many ſtones of $\frac{3}{4}$ foot long, $\frac{2}{3}$ foot broad, and $\frac{4}{5}$ foot thick, would build a wall of 160 feet long, 30 feet high, and 2 feet thick? Anſwer 24000.
18 If a ciſtern of $17\frac{1}{2}$ feet long, $10\frac{1}{2}$ feet broad, and 13 feet deep, holds 546 barrels of water, how many barrels will a ciſtern hold of 16 feet long, 7 feet broad, and 15 feet deep? Anſwer 384 barrels.
19. If 6 ſhoemakers, in 4 weeks, make 36 pair of men's, and 24 pair of women's ſhoes; how many pair of each ſort would 18 ſhoemakers make in 5 weeks? Anſwer, 135 pair of men's, and 90 pair of women's ſhoes.

CHAP. XIX.

THE RULE OF THREE INVERSE.

Sect. I.

Whereas in the Rule of Three Direct more requires more, or leſs requires leſs; ſo here, on the contrary, more requires leſs, and leſs requires more: that is, the greater the third number is, the leſſer the fourth will be, and the leſſer the third number is, the greater the fourth will be.

RULE.

Let your firſt and laſt number be of one name, then multiply your firſt and ſecond number together, and the product divide by the third number, and the quotient is the anſwer required.

EXAMPLE.

1. A captain of a ſhip being provided with proviſions for 40 men, 10 months; how long would the ſaid proviſions laſt for 32 men? Anſwer 12½ months.

men — *months* — *men*

If 40 —— 10 —— 32

10

———

32) 400 (12½ Anſwer.

32

———

80

64

———

$16\left\{\begin{array}{l} 16|1 \\ \hline 32|2 \end{array}\right.$

2. If 12½ months proviſions ſerve 32 men, how long will the ſame ſerve 40 men? Anſwer 10 months.

3. A merchant has agreed with a carrier to carry 12 cwt. of merchandizes 70 miles for 13 crowns; but the cars

being laden, the carrier is obliged to unlade 2 cwt. of the ſaid goods; however, the merchant will ſtill give the 13 crowns, provided he carries the goods ſo much farther in proportion: I demand how many miles they muſt be carried. Anſwer 84 miles.

4. If 10 cwt. are to be carried 84 miles for 13 crowns, how many miles are 12 cwt. to be carried for the ſame money? Anſwer 70 miles.

5. If I had bought 30 yards of cloth of 2 yards broad, and would have baize of 3 yards broad, to line the ſame withal; I demand how many yards I ſhould want. Anſwer 20 yards.

6. If I lend my friend 400l. for 7 months, how much money ought he to lend me again for 12 months? Anſwer 233l. 6s. 8d.

7. Suppoſe 4000 ſoldiers in a town were provided with proviſions for three months; how many men muſt they ſend out, in caſe they would have the proviſions laſt eight months? Anſwer 2500 men.

8. When the buſhel of wheat coſts 5s. 8d. the penny loaf weighs $11\frac{1}{2}$ oz. what muſt it weigh when the buſhel coſts 10s. 9d? Anſwer $6\frac{8}{129}$ ounces.

9. If 136 maſons can make a fort in 28 days, and that it was required to have the ſame finiſhed in 8 days: I demand how many maſons would do it. Anſwer 476 maſons.

10. How many yards of linen of $\frac{5}{8}$ yard broad would be wanted to line $9\frac{2}{3}$ yards of cloth of $1\frac{1}{4}$ yard broad? Anſwer $14\frac{1}{2}$ yards.

11. If a horſeman rides 100 miles in 33 hours, 20 minutes, that is at the rate of 3 miles an hour; in what time would he ride the ſame diſtance, if he went at the rate of $5\frac{1}{4}$ miles an hour? Anſwer 19 hours, $2\frac{6}{7}$ min.

12. If, with 100l. in 365 days, I gain 6l. with how many pounds ſterling could I gain the ſame ſum in 30 days? Anſwer, with 1216l. 13s. 4d.

13. If 6 perſons, in 4 hours, drink 3 gallons of beer, in what time would 5 perſons drink the ſame quantity, at the ſame rate? Anſwer, in 4 hours, 48 minutes.

14. What ſum ought to be put at intereſt at 6 per cent. to gain, in one month, as much as 100l. would gain in 12 months? Anſwer 1200l.

CHAP. XX.

THE DOUBLE RULE OF THREE COMPOUND.

Sect. I.

This Rule, like the Double Rule of Three Direct, contains alſo two Rules of Three, but the one is Direct, and the other Inverſe.

EXAMPLE.

1. If 100l. in 12 months gain 5l. with how many pounds can I then gain in 16 months 30l.? Anſwer 450l.

16 *l. ſtock* 12
Months 12 > 100 < 16 Inverſe.
Gain 5 30 Direct.

80 360
100

8|0) 3600|0

£. 450 Anſwer.

Or thus, by Direct Rules.

mon. *l. gain.* *mon.*
If 12 —— 5 —— 16
5

12) 80

$6\frac{2}{3}$

l. gain *l. ſtock* *l. gain*
If $6\frac{2}{3}$ —— 100 —— 30
— 100
20 ——
3000
3
——
2|0) 900|0
——
£. 450 Anſw.

Or thus:

mon. *l.* *mon.*
Inverſe 12 —— 100 —— 16
100
——
16) 1200 (75
112
——
80
80
——

l. *l.* *l.*
Direct 5 —— 75 —— 30
30
——
5) 2250
——
£. 450 Anſw.

2. With how many pounds ſterling could I gain 5l. per ann. if with 450l. I gain in 16 months 30l.? Anſwer, with 100l.
3. If 8l. are gained in 12 months with 100l. with how much money can I gain 8l. 12s. in 5 months? Anſwer, with 258l.
4. If 200 lb. of merchandizes are carried 40 miles for 3s. how many lb. might be carried 60 miles for 22l. 14s. 6d.? Anſwer 20200 lb.
5. If a wall of 28 feet high is built in 15 days by 68 men, how many men could build a wall of 32 feet high in 8 days? Anſwer $145\frac{5}{7}$ men.

6. If for 3s. 200 lb. of merchandizes are carried 40 miles, how many miles might 20200 lb. be carried for 22l. 14s. 6d.? Anſwer 60 miles.

7. If 145 men in 8 days can make a wall of 32 feet high, how many men would make a wall of 28 feet high in 15 days? Anſwer $67\frac{2}{3}$ men.

8. If 80000 cwt. of ammunition were to be removed from a place in 9 days, and that in 6 days time I find to have been carried away 4500 cwt. with 18 horſes; how many horſes would be wanted to carry the remainder away in 3 days? Anſwer 604 horſes.

9. In what time could I, with 600l. gain 33l. 6s. 8d. at $6\frac{1}{4}$l. per cent. per ann.? Anſwer 10 months and 20 days, or $10\frac{2}{3}$ months.

10. If $33\frac{1}{3}$l. is gained with 600l. in $10\frac{2}{3}$ months, in what time could I get $6\frac{1}{4}$l. with 100l? Anſwer, in 1 year.

CHAP. XXI.

OF INTEREST.

SECT. I.

1. How much is the intereſt of 100l. for $4\frac{1}{2}$ years, at the rate of 8l. per cent.? Anſwer 36l.

year — *l.* — *years.*
If 1 — 8 — $4\frac{1}{2}$
2 — — 9
2 — — 8
2) 72
Anſ. 36

Or thus:
l.
8
$4\frac{1}{2}$
4 years 32
$\frac{1}{2}$ year 4
Anſ. 36

2. What is the intereſt of 100l. for 5 years and 3 months, at the rate of 8l. per cent.? Anſwer 42l.
3. How much is the intereſt of 100l. for a year and 9 months, at 6l. per cent.? Anſwer 10l. 10s.
4. What is the intereſt of 100l. for 7½ months, at 7l. per cent.? Anſwer 4l. 7s. 6d.
5. Caſt up the intereſt of 100l. for 10 years and 4 months, at 6l. per cent. Anſwer 62l.
6. Tell me the intereſt of 100l. for 1½ month, at 8l. per cent. Anſwer 1l.

II.

7. What is the intereſt of 211l. 5s. for 1 year, at 6l. per cent.? Anſwer 12l. 13s. 6d.

```
      l.    s.
     211    5
     at     6 per cent.
    ------------
 £. 12|67  10
          20
    ------------
 s. 13|50
       12
    ------------
 d.  6|00
      Anſwer £. 12 13 6
```

8. How much is the intereſt of 300l. 10s. for one year, at the rate of 8l. per cent.? Anſwer 24l. 0s. 9⅗d.
9. What will the above ſum come to for 9 months? Anſwer 18l. 0s. 7⅕d.
10. Caſt up the intereſt of 580l. 15s. for 1 year, at 6l. per cent. Anſwer 34l. 16s. 10⅘d.
11. Tell me the intereſt of 344l. 17s. 6d. for 1 year, at the rate of 6l. per cent. Anſwer 20l. 13s. 10⅕d.

III.

12. What is the intereſt of 340l. for 1½ year, at 8l. per cent.? Anſwer 40l. 16s.

l.
340
at 8 per cent.

£. 27|20
20

s. 4|00

	l.	*s.*	*d.*
for 1 year	27	4	0
½ year	13	12	0
Anſ.	40	16	0

13. Caſt up the intereſt of 1000l. for 15 months, at 8l. per cent. Anſwer 100l.
14. What will the above ſum come to for 21 months? Anſwer 140l.
15. Tell me the intereſt of 1090l. for 17 months, at 8l. per cent. Anſwer 123l. 10s. 8d.
16. How much will the intereſt of the foregoing ſum come to for 23 months? Anſwer 167l. 2s. 8d.
17. What is the intereſt of 150l. for 3½ months, at 8l. per cent.? Anſwer 3l. 10s.
18. Caſt up the intereſt of 514l. for 1 year, 7½ months, at 8l. per cent. Anſwer 66l. 16s. 4⅘d.

IV.

19. How much is the intereſt of 348l. 15s. for 18 months, at 7l. per cent.? Anſwer 36l. 12s. 4½d.

l. *s.*
348 15
at 7 per cent.

24|41 5
20

8|25
12

3|00

	l.	*s.*	*d.*
for 1 year	24	8	3
for ½ year	12	4	1½
Anſwer	36	12	4½

20. At 8l. per cent. what will 468l. 16s. 8d. come to for 1 month? Anſwer 3l. 2s. 6 2/15d.
21. At 7l. per cent. tell me what will 3800l. 14s. 4d. come to for 1⅓ year? Anſwer 354l. 14s. 8 4/75d.

22. What will 3020l. come to for $5\frac{1}{2}$ months, at 8l. per cent.? Anſwer 110l. 14s. 8d.

23. How much is the intereſt of 175l. 10s. 6d. for 1 year, 7 months, at 6l. per cent.? Anſwer 16l. 13s. $5\frac{97}{100}$d.

24. Caſt up the intereſt of 886l. 16s. for 1 year, $11\frac{1}{2}$ months, at 8l. per cent. Anſwer 138l. 18s. $7\frac{17}{25}$d.

V.

25. How much is the intereſt of 100l. from the 7th of May to the 26th of September, at 8l. per cent.? Anſwer 3l. 2s. $2\frac{70}{73}$d.

	days.
May	24
June	30
July	31
Aug.	31
Sept.	26

days *l.*

If 365 —— 8 —— 142

8

l. s. d.

365) 1136 (3 2 $2\frac{70}{73}$

1095

41

20

s. d.

365) 820 (2 $2\frac{70}{73}$

730

90

12

d.

365) 1080 ($2\frac{70}{73}$

730

$$5\left\{\frac{350|70}{365|73}\right.$$

26. What is the intereſt of 100l. from the 4th of March to the 29th of September, at 7l. per cent.? Anſwer 4l. 0s. $1\frac{71}{73}$d.

27. At 6l. per cent. what will the intereſt be of 100l. from the 5th of July to the 9th of January? Anſwer 3l. 1s. $9\frac{5}{7}\frac{1}{3}$d.

28. Caſt up the intereſt of 100l. at 8l. per cent. from the 6th of June to the 28th of December. Anſwer 4l. 9s. $10\frac{2}{7}\frac{6}{3}$d.

29. Tell me the intereſt of 100l. from the 10th of May to the 30th of Auguſt, at 8l. per cent. Anſwer 2l. 9s. $1\frac{1}{7}\frac{1}{3}$d.

30. How much is the intereſt of 100l. from the 3d. of April to the 25th of February, at 7l. per cent.? Anſwer 6l. 5s. $9\frac{5}{7}\frac{1}{3}$d.

VI.

31. How much is the intereſt of 175l. for 1 year and 73 days, at 8l. per cent. per ann.? Anſwer 16l. 16s.

l. — *l.* — *l.*
If 100 —— 8 —— 175
8
1|00) 14|00
£. 14

days — *l.* — *days*
If 365 —— 14 —— 73
14
292
73
l. *s.*
365) 1022 (2 16
730
292
20
s.
365) 5840 (16
365
2190
2190

l.	*s.*	*d.*	
14	0	0	
2	16	0	
16	16	0	Anſw.

Or thus:

l.

£. 100 > 8 < 175 l.

Days 365   438 Days.

36500   1400

525

700

76650

8

l.

36500) 613200 (16

36500

248200

219000

29200

20

s.

36500) 584000 (16

36500

219000

219000

32. Caſt up the intereſt of 240l. for 1 year and 135 days, at 7l. per cent. Anſwer 23l. 0s. $3\frac{21}{73}$d.

33. What is the intereſt of 371l. for 1 year and 213 days, at 6l. per cent.? Anſwer 35l. 5s. $0\frac{36}{1825}$d.

34. Tell me the intereſt of 564l. for 1 year, 335 days, at 8l. per cent. Anſwer 86l. 10s. $7\frac{41}{73}$d.

35. How much is the intereſt of 150l. 15s. 6d. for 53 days, at 7l. per cent. Anſwer 1l. 10s. $7\frac{14753}{18250}$d.

VII.

36. A merchant takes at intereſt 250l. at 8l. per cent. for 2 years, with condition to pay before the time as much of the principal as he pleaſes: now at the expi-

ration of 9 months he pays 80l. and 6 months after 70l. leaving the reſt the full time of the aforeſaid 2 years: I deſire to know how much principal and intereſt the ſaid merchant is then to pay. Anſ. 127l. 16s.

l. 100 × 12 = 1200 > 8 < l. 250 × 9 = 2250 × 8

1200) 18000 (15 l.
1200
6000
6000

l. 250
80
170

l. 100 × 12 = 1200 > 8 < l. 170 × 6 = 1020 × 8

1200) 8160 (6 l. 16 s.
7200
960
20

1200) 19200 (16 s.
1200
7200
7200

```
  l.         l.       l.
  100    >   8   <   100
   12                  9
 ----               -----
 1200                 900
                        8
                  -------
          12|00 ) 72|00
                  -------
                       6
```

	l.	s.	d.
	15	0	0
	6	16	0
	6	0	0
Intereſt	27	16	0
Principal	100	0	0
Anſwer	127	16	0

37. Suppoſe I take at intereſt 300l. at 6l. per cent. for 18 months, with condition to pay as much of the principal before the time as I pleaſe: now after 3 months time I pay 60l. and 4 months after that 100l. and 5 months after that I pay 75l.: I deſire to know how much I have yet to pay for principal and intereſt at the expiration of the ſaid 18 months. Anſ. 79l. 15s.

38. Given at intereſt 600l. the 13th of May, 1717, for 1 year, at the rate of 5l. per cent. with condition that the receiver may diſcharge as much of the principal before the time as he pleaſes. Now he pays the 9th of July 200l. and the 17th of September 150l.: I deſire to know how much principal and intereſt he is more to pay at the expiration of the year, counting it 365 days. Anſwer 266l. 13s. $5\frac{7}{73}$d.

39. A. gives to B. at intereſt, 1ſt. of November, 1717, 6000l. at $4\frac{1}{2}$l. per cent. B. to repay him with intereſt, at the expiration of 2 years, having liberty to

pay before that time as much of the principal as he pleaſes: Now B. pays

	£.
The 16th of December, 1717	900
The 11th of March	1260
The 30th of ditto	600
The 17th of Auguſt	800
The 12th of February, 1718	1048

I want to know how much principal and intereſt B. is to pay 1ſt. of November, 1719. Anſwer 1642l. 9s. $2\frac{1545}{1827}$d.

OF INTEREST UPON INTEREST.

Sect. VIII.

1. What will 500l. amount to for 3 years, at 8l. per cent. intereſt upon intereſt? Anſwer 629l. 17s. $1\frac{1}{2}\frac{1}{3}$d.

```
       l.         l.        l.
If 100 —— 108 —— 500
                    500
           ————————   l.
     100 ) 54000 ( 540 the firſt year.
               500
              ————
               400
               400
              ————
```

If

l. *l.* *l.*
If 100 —— 108 —— 540
540
4320
540
l. *s.*
100) 58320 (583 4 the ſecond year.
500
832
800
320
300
20
20
s.
100) 400 (4
400

l. *l.* *l.* *s.*
If 100 —— 108 —— 583 4
20 20
2000 11664
108
93312
116640
1259712

l. *s.* *d.*

2000) 1259712 (629 17 $1\frac{11}{25}$ Anſ.

12000

5971

4000

19712

18000

1712

20

s. *d.*

2000) 34240 (17 $1\frac{11}{25}$

2000

14240

14000

240

12

d.

2000) 2880 ($1\frac{11}{25}$

2000

$80\left\{\frac{880|11}{2000|25}\right.$

Or thus:

prin. *int.* *prin.*

If 100 —— 8 —— 500

8

1|00) 40|00

40

l.
500
40

l. l.
If 100 —— 8 —— 540
8

l. s.
100) 4320 (43 4
400

320
300

20
20

s.
100) 400 (4
400

l. s. d.
540 0 0
43 4 0

583 4 0

l. l. l. s.
If 100 —— 8 —— 583 4
20 20

2000 11664
8

l. s. d.
2000) 93312 (46 13 1$\frac{11}{25}$
8000

13312
12000

1312
20

26240

s. d.
2000) 26240 (13 $1\frac{11}{25}$
2000

6240
6000

240
12

d.
2000) 2880 ($1\frac{11}{25}$
2000

$80\left\{\frac{880|11}{2000|25}\right.$

	l.	s.	d.
	40	0	0
	43	4	0
	46	13	$1\frac{11}{25}$
Principal	500	0	0
£.	629	17	$1\frac{11}{25}$ Anſwer.

Or thus:

l. l. l.
If 100 —— 108 —— 500
20

10000
12

120000
108

960000
1200000

The 1ſt. year 129690(00

The 1ſt. year 129600(00
108

1036800
1296000

The 2d. year 139968(00
108

1119744
1399680

The 3d. year 151165(44|11
100|25

12) 151165

2|0) 12591|7 $1\frac{11}{25}$

£. 629 17 $1\frac{11}{25}$ Anſ.

CHAP. XXII.

OF BARTER.

SECT. I.

1. A merchant barters 10 pieces of drugget, containing each 25 yards, at $18\frac{1}{2}$d. the yard, againſt pepper at 15d. the lb. how much pepper muſt he receive? Anſwer $308\frac{1}{3}$ lb.

```
       ps.
        10
        25
      ————
        50
       20
      ————
       250
        18½
     —————
      2000
      250
      125
     —————
15) 4625 (308⅓ lb.
    45
    ———
     125
     120
     ———
   5{ 5|1
     15|3
```

2. A merchant has 1000 lb of ſugar, which he barters at 9½d. the lb. againſt tobacco at 10¼d. the lb. how much tobacco muſt he receive? Anſwer $926\frac{34}{41}$ lb.

3. A. gives to B. 250 yards of drugget, at 18½d. the yard for 308⅓ lb. of pepper; I demand how much the pepper ſtands him in the lb. Anſwer 15d.

4. A. has 1200 ſtone of tallow at 2s. 3¼d. the ſtone; B. has 110 tann'd hides, weight 3994 lb. at 5¾d. the lb. and they barter at theſe rates; tell me how much money A. is to receive of B. beſides the hides. Anſwer 40l. 11s. 2½d.

5. A. trucks druggets of 18½d. the yard, againſt 308⅓ lb. of pepper at 15d. the lb.: how many pieces of drugget (every piece 25 yards) has he delivered? Anſwer 10 pieces.

II.

6. A. has ſilk of 14s. per lb. B. has cloth of 10s. the

yard, which he barters at 12s. 6d. the yard: at how much muſt A. put his ſilk to make his profit equal to B.? Anſwer 17s. 6d.

```
     s.          s.  d.          s.
If 10 ———————— 12  6 ———————— 14
               12               150
              ———              ———
              150               700
                                 14
                               ———
                        1|0 ) 210|0
                               ———
                         12 ) 210
                               ———
                                17  6 Anſ.
```

Or thus:

```
               s.  d
               12  6
               10  0
     s.       ———          s.
If 10 ————————  2  6 ———————— 14
               12
               ——
               30
               14
               ——
              120
               30
              ———               s.  d.
       1|0 ) 42|0                3  6
              ———               14  0
        12 ) 42                ———————
              ———         Anſ. 17  6
               3  6            ———————
```

7. A. has coffee which he barters with B. at 10d. per lb. more than it coſt him, againſt tea which ſtands B. in 10s. the lb. but puts it at 12½s. I would know how much the coffee coſt at firſt. Anſwer 3s. 4d.

8. A. has 150 barrels of barley, which coſt him 5s. per barrel, which he barters at 5s. 10d. with B. who has

wheat that coſt him 12s. the barrel: at how much muſt B. put his wheat to gain in proportion as much as A. and how many barrels is he to deliver? Anſwer 62$\frac{1}{2}$ barrels, at 14s.

9. Two perſons barter, the one has butter which coſt him 28s. per cwt.; the other has beef which coſt 22s. 6d. per barrel: now they have both a mind to gain 8l. per cent. tell me at how much they muſt put up their goods. Anſwer, at 30s. 2$\frac{22}{25}$d. per cent. and at 24s. 3$\frac{3}{5}$d. per barrel.

10. A. and B. barter ſome goods, A. puts his at 30$\frac{6}{25}$s. and then he gains 8l. per cent.; B. gains the ſame, for he puts his at 24$\frac{3}{10}$s.; now let me know how much theſe goods coſt at firſt. Anſwer 28s. and 22s. 6d.

III.

11. B. has 5 hhds. of brandy at 25l. 10s. per hhd. and 10$\frac{1}{2}$ tun of tallow at 33l. 15s. per tun, which he barters with C. thus; to have 150l. 1s. 6d. in money, and the reſt in beef at 21s. per barrel: how many barrels is he to receive? Anſwer 316 barrels.

	l.		l.	s.	d.
5 hhds. at	25$\frac{1}{2}$	per hhd. is	127	10	0
10$\frac{1}{2}$ tun at	33$\frac{3}{4}$	per tun is.	354	7	6
			481	17	6
		Caſh	150	1	6

s.		bar.			
If 21	——	1	——	331	16	0

20

6636

1

21) 6636 (316 Anſ.

63

33

21

126

126

12. A. has 5 bales of pepper, weight neat 1600 lb. at 17d. per lb. which he barters with B. for two ſorts of goods, the one at 5d. the other at 8d. per lb. to have $\frac{1}{3}$ in money, and of each ſort of goods an equal quantity; I demand how many lb. of each ſort of goods, and how much money he is to receive. Anſwer $1394\frac{34}{39}$lb. of each, and 37l. 15s. $6\frac{2}{3}$d. in money.

13. Two merchants barter, C. has 10 hhds. of madder, weight neat 90 cwt. 3 qrs. 14 lb. coſt 38s. 6d. per cwt. and puts it at 42s. per cwt.; D. has hemp which coſt 34s. 10d. per cwt.; C. deſires $\frac{1}{4}$ in money and the reſt in hemp: tell me how much money and hemp C. is to receive, alſo at how much D. muſt put the price of the hemp, to make the barter equal. Anſwer, C. muſt receive 47l. 14s. $2\frac{1}{4}$d. and 75 cwt. 1 qr. $9\frac{1}{38}$ lb. of hemp, at the rate of 38s. per cwt.

14. C. barters 10 hhds. of madder, weight 90 cwt. 3 qrs. 14 lb. which he puts at 42s. per cwt. for which D. is to give him $\frac{1}{4}$ part in money and the reſt in hemp, which coſt him 34s. 10d. per cwt. but puts it at 38s. what is the firſt coſt of the madder, allowing C. did riſe his price in proportion to D. and how much money and hemp is C. to receive? Anſwer, the madder coſt 38s. 6d. per cwt. and C. is to receive 47l. 14s. $2\frac{1}{4}$d. in money, and 75 cwt. 1 qr. $9\frac{1}{38}$ lb. in hemp.

IV.

15. A. has merchandizes which coſt him 30s. per cwt. but put them at 34s. B. has merchandizes which coſt him 25s. per cwt. and puts them at 28s. per cwt. and ſo they barter their goods: now I want to know who has made the beſt bargain, and by how much per cwt. Anſwer, A. gains $1\frac{1}{3}$s. per cwt. more than B.

$$\text{If } \overset{s.}{30} \text{ ——— } \overset{s.}{4} \text{ ——— } \overset{s.}{100}$$

$$\begin{array}{r} 100 \\ 4 \\ \hline 3|0)\ 40|0 \\ \hline 13\frac{1}{3} \end{array}$$

$$\begin{array}{rcccl} & s. & & s. & \quad s. \\ \text{If } 25 & \text{———} & 3 & \text{———} & \quad 100 \\ & & & & \quad\;\; 3 \\ & & & & \quad \overline{} \quad s. \\ & & & 25\,) & 300\,(\,12 \\ & & & & \quad 25 \\ & & & & \quad \overline{} \\ & & & & \quad 50 \\ & & & & \quad 50 \\ & & & & \quad \overline{} \end{array}$$

16. A. and B. barter, A. has cloth which coſt 28d. the yard, but puts it at 32d.; B. has cloth which coſt 22d. the yard: tell me how high B. muſt put his cloth to gain 5 per cent. more than A. Anſ. $26\frac{17}{70}$ per cent.

17. A. and B. barter, A. has cloth which coſt him 28d. the yard, B.'s coſt 22d. and puts it up at 25d.: tell me how high A. muſt put his, to gain 10 per cent. more than B. Anſwer $34\frac{34}{55}$.

18. C. and D. barter, C. makes 6s. 8d. of 7s. D. makes 7s. 3d. of 7s. 6d. I demand who has loſt moſt, and how much per cent. Anſwer C. loſes $1\frac{3}{7}$ per cent. more than D.

19. A. puts his merchandize from 3l. 10s. to 4l. 6s. B. puts his from 1l. 16s. to 2l. 4s. and ſo they barter; A. has a mind to gain yet 10s. more: I demand how high B. muſt put his price to make the barter equal. Anſwer 2l. $9\frac{13}{35}$s.

20. A. and B. barter, A. has muſlin which coſt him 30s. per piece, but has a mind to gain 10 per cent.; B. has ſilk which coſt 42s. per piece: tell me at how much B. muſt put his ſilk to make the barter equal. Anſwer $46\frac{1}{5}$s.

21. A. has ſugar which coſt him 59s. 6d. per cwt. and has a mind to gain 15 per cent.; B. has oil coſt 6s. 3d. per gallon; at how much muſt B. put his oil to gain as much per cent. as A.? Anſwer, at 7s. $2\frac{1}{4}$d.

V.

22. A. has cloth of 8d. the yard, and in barter puts it at 13d. and gives 9 months time for the payment; B. has goods which coſt 12d. per lb. and gives 6 months

time

time for the payment: tell me how high B. muſt put his goods to make an equal barter. Anſ. at 17d.

$$\begin{array}{r} d. \\ 13 \\ 8 \\ \hline 5 \end{array}$$

$$\text{If } \overset{mo.}{9} \text{ —— } 5 \text{ —— } \overset{mo.}{6}$$

$$\begin{array}{r} 6 \\ 5 \\ \hline 9\,)\,30 \\ \hline 3\tfrac{1}{3} \end{array}$$

$$\begin{array}{r} d. \\ 3\tfrac{1}{3} \\ 8 \\ \hline \end{array}$$

$$\text{If } \overset{d.}{8} \text{ —— } 11\tfrac{1}{3} \text{ —— } \overset{d.}{12}$$

$$\begin{array}{r} 8 \\ 3 \\ \hline 24 \end{array} \qquad \begin{array}{r} 11\tfrac{1}{3} \\ 3 \\ \hline 34 \end{array} \qquad \begin{array}{r} 12 \\ 34 \\ \hline 48 \\ 36 \\ \hline 24\,)\,408\,(\,\overset{d.}{17} \text{ Anſ.} \\ 24 \\ \hline 168 \\ 168 \\ \hline \end{array}$$

23. A. and B. barter their goods; A's coſt 8d. per lb. but charges it at 13d. and gives 9 months time; B. charges his at 17d. and gives 6 months time; tell me how much B.'s goods coſt. Anſ. 12d.

24. Two perſons barter, A. has ſugar at 8d. the lb. but charges it at 13d. the lb. and gives 9 months; B. has cocoa at 12d. the lb. charges it at 17d. the lb.: I demand how much time B. muſt give to make the barter equal. Anſwer 6 months.

25. A. and B. barter; A. has goods which coſt 15s. which he charges at 20s. giving 6 months time; B.

has goods which coſt 1l. 10s. and charges them at 2l. 5s.: I demand what time he muſt give to make an equal barter. Anſwer 9 months.

CHAP. XXIII.

FELLOWSHIP, OR COMPANY.

SECT. I.

This rule teaches, when two or more merchants put together a general ſtock in trade, or are concerned in ſhips, &c. to know how to find every perſon's particular ſhare of the loſs or gain, in proportion to his principal in the joint ſtock.

Bankrupts eſtates, legacies in caſe of deficiency of effects, and many other things of the like nature, may alſo be adjuſted by this rule, as the following examples will ſufficiently ſhew.

1. A. and B. buy certain merchandizes, amounting to 80l. of which A. pays 30l. and B. 50l. and they gain by thoſe goods 20l. now I would know each man's ſhare of the profit, according to their ſtock put in. Anſwer A. 7l. 10s. and B. 12l. 10s.

RULE.

Add each man's ſtock together; then as the whole ſtock is to the whole gain, ſo is each man's particular ſtock to each man's particular gain.

EXAMPLE.

l.
A. 30
B. 50
—
If 80 ——20 <

l. *s.*
30 Anſ. 7 10
50 Anſ. 12 10
——
20 0

2. A. and B. have gained by merchandizing 182l. A. put in 300l. and B. 400l.: I demand each his ſhare of the profits. Anſwer A. 78l. and B. 104l.

3. Two perſons are to ſhare 100l. of which A. is to have $\frac{1}{2}$, and B. the $\frac{1}{4}$ part: I demand what each juſtly ought to have. Anſwer A. $66\frac{2}{3}$l. and B. $33\frac{1}{3}$l.

4. A merchant being deceaſed, it is found he owes to A. 500l. and to B. 900l. though he left but 1100l. behind him: I demand how much each is to have in proportion to his debt. Anſwer A. $392\frac{6}{7}$l. and B. $707\frac{1}{7}$l.

5. B. and C. are left a legacy of 120l. of which B. is to have half, and C. the $\frac{1}{4}$; now tell me how much each is to have according to his ſhare in the 120l. Anſwer B. 80l. and C. 40l.

6. Three merchants load a ſhip with corn, A. puts in 200, B. 300, and C. 400 quarters: at ſea the maſter is obliged by ſtorm to heave 180 quarters over-board; tell me how much each merchant ought to loſe for his ſhare. Anſwer A. 40, B. 60, and C. 80 quarters.

7. Two cities, London and Briſtol, diſtant ſuppoſe 120 miles: A. ſets out from London towards Briſtol, B. ſets out from Briſtol towards London; A. goes 12 miles a day, and B. 8 miles a day: I demand how many miles each has travelled when they meet. Anſ. A. 72, and B. 48 miles.

8. Two merchants have gained 450l. of which A. is to have 3 times as much as B.: tell me how much each is to have. Anſwer A. 337l. 10s. and B. 112l. 10s.

9. Three perſons have to ſhare 600l. A. is to have a certain ſum, B. as much again as A. and C. three times as much as B.: I demand each man's part. Anſwer A. $66\frac{2}{3}$l. B. $133\frac{1}{3}$l. and C. 400l.

10. Three perſons are to pay a tax of 100l. according to their eſtates; now A. is found to be worth 800l. B. 600l. and C. 400l.: how much is each of them to pay? Anſwer A. $44\frac{4}{9}$l. B. $33\frac{1}{3}$l. and C. $22\frac{2}{9}$l.

11. Three perſons have gained 1320l. now when A. takes 6l. B. takes 4l. and C. 2l. I demand how much each gets. Anſwer A. 660l. B. 440l. and C. 220l.

12. A. and B. have gained 600l. whereof A. takes 10 per cent. more than B.; I demand how much each receives. Anſwer A. $314\frac{2}{7}$l. and B. $285\frac{5}{7}$l.

13. Three perſons are to divide a legacy of 600l. A. is to have $\frac{1}{2}$, B. $\frac{1}{3}$, and C. $\frac{1}{4}$; I demand each of their ſhares. Anſ. A. $276\frac{12}{13}$l. B. $184\frac{8}{13}$l. and C. $138\frac{6}{13}$l.

14. Three merchants formed a company, A. put in 150l. and B. 260l. and they gained 65l. whereof C.'s ſhare came to 16l.: I would know A.'s and B.'s part of the gain, and how much C. put in. Anſwer C. put in 169l. 6s. $11\frac{11}{23}$d. A.'s profit 16l. 16s. $7\frac{1}{41}$d. B.'s profit 29l. 3s. $4\frac{40}{41}$d.

15. Three perſons join, A. and B. put in a certain ſtock, and C. puts in 1090l. they gain 110l. whereof A. took 35l. and B. 29l.: tell me how much A. and B. put in, and C.'s ſhare of the gain. Anſwer C.'s ſhare of the profit was 46l. A. put in 829l. 6s. $11\frac{11}{23}$d. B. put in 687l. 3s. $5\frac{17}{23}$d.

CHAP. XXIV.

FELLOWSHIP WITH TIME.

SECT. I.

1. Three merchants made a company; A. put in 30l. for 4 months, B. put in 20l. for 5 months, C. put in 15l. for 6 months, and with this ſtock they gain 31l. I demand each man's ſhare of the gain. Anſwer A. 12l. B. 10l. and C. 9l.

RULE.

Multiply each man's ſtock by its time, and the products add together; then ſay, as the whole ſtock and time is to the whole loſs or gain, ſo is each man's particular ſtock and time to each man's particular loſs or gain.

EXAMPLE.

A. 30	B. 20	C. 15
m. 4	*m.* 5	*m.* 6
120	100	90

120
100
90

If 310 —— 31 —— $\begin{cases} 120 \\ 100 \\ 90 \end{cases}$

Anſw.
12 for A.
10 for B.
9 for C.
31

2. Two merchants formed a company, A. put in 100l. for 4 months, and B. put in 136l. for 3 months, and they gain 50l.: I demand each man's ſhare of the profit. Anſwer A. 24l. $15\frac{5}{101}$s. and B. 25l. $4\frac{96}{101}$s.
3. Three graziers hired a piece of land for 60l. 10s. A. put in 5 oxen for $4\frac{1}{2}$ months, B. put in 8 oxen for 5 months, and C. put in 9 oxen for $6\frac{1}{2}$ months: I demand how much each muſt pay. Anſwer A. 11l. 5s. B. 20l. and C. 29l. 5s.
4. Three perſons have received 665l. intereſt, A. had put in 4000l. for 12 months, B. 3000l. for 15 months, and C. 5000l. for 8 months; how much is each man's part of the intereſt? Anſwer A. 240l. B. 225l. and C. 200l.
5. Three perſons hired a piece of land for 12l. 10s. 6d. A. put in 20 ſheep for 5 days, B. put in 16 ſheep for 7 days, and C. put in 25 ſheep for 4 days: I demand how much each muſt pay. Anſwer A. 4l. 0s. $3\frac{5}{13}$d. B. 4l. 9s. $11\frac{1}{13}$d. and C. 4l. 0s. $3\frac{6}{13}$d.
6. Three merchants loſt by ſome dealings 45l. 10s. A.'s ſtock was 100l. for $6\frac{1}{2}$ months, B.'s 100l. for $9\frac{1}{2}$ months, and C.'s 150l. for $8\frac{2}{3}$ months; what is each man's part of the loſs? Anſwer A. 10l. $3\frac{28}{29}$s. B. 14l. $18\frac{3}{29}$s. and C. 20l. $7\frac{27}{29}$s.
7. Three merchants put in a ſtock, viz. A. puts in, the 1ſt of January, 120l. until the 23d of March; B. puts in 176l. the 10th of February, until the 12th of April; C. puts in 295l. the 2d of February, until the 25th of April, and they gain 800l.: I want to know

each man's part of the gain, allowing 28 days to the month of February. Anſwer A. 174l. 3s. $4\frac{18600}{22323}$d. B. 192l. 7s. $6\frac{30090}{22323}$d. C. 433l. 9s. $1\frac{422}{14882}$d.

8. Four perſons hired a boat for 19s. to go 24 miles; but being come within 9 miles of the place where they intended to go, there came two perſons who deſired to come into the boat with condition to pay proportionably; tell me how much each of them is to pay. Anſwer, the 4 firſt perſons 16s. and the 2 laſt 3s.

9. Four perſons hired a coach to go 50 miles for 40s. now when they had gone 20 miles they met two perſons who deſired to come in the coach, with condition to pay proportionably: how much is each of them to pay? Anſw. the 4 firſt perſons 1l. 10s. $9\frac{3}{13}$d. and the 2 laſt 9s. $2\frac{10}{13}$d.

CHAP. XXV.

LOSS AND GAIN.

SECT. I.

1. Bought a piece of cloth, 53 yds. long, at 12s. the yard; ſold the ſame at 14s. the yard: what is the profit on the whole piece? Anſwer 5l. 6s.

s.
14 Sold
12 Bought
—
2
53
—
2|0) 10|6
—
£. 5 6 Anſw.

2. If 1 lb. of pepper coſt 15d. and is ſold for 17d. what is the profit upon 3 bales, weight 980 lb.? Anſwer 8l. 3s. 4d.

3. Bought a piece of cloth 53 yards long, for 31l. 16s. and ſold it at 14s. the yard: I demand what is gained by the whole piece. Anſwer 5l. 6s.

4. If 980 lb. of merchandizes are bought for 61l. 5s. and ſold for 69l. 8s. 4d. I demand the profit upon each lb. Anſwer 2d.

5. Bought 12 hhds. of wine at 10l. 5s. the hhd.; paid for cellarage and other charges 4s. 6d. per hhd.; ſold the hhd. for 37 qr. guineas, each at 5s. 3d.: I demand profit or loſs. Anwer 9l. 3s. loſs.

6. A merchant buys 100 caſks of butter, weight neat 210 cwt. 2 qrs. 14 lb. at 50s. per cwt.; pays for ſundry charges 1l. 5s.: I demand his profit, if he ſells the ſaid butter at 56s. per cwt. Anſwer 61l. 18s. 9d.

II.

7. If a tun of tallow coſt 32l. 15s. and is ſold for 37l. 10s. I demand how much is the profit per cent. Anſwer $14\frac{66}{131}$l.

l. *s.*
37 10
32 15

l. *s.* *l.*
If 32 15 —— 4 15 —— 100
Anſwer $14\frac{66}{131}$ per cent.

8. If I buy a pound of cloves for 6s. 3d. and ſell it for 6s. how much per cent. loſs is it? Anſ. 4 per cent.

9. Bought 1000 buſhels of wheat at 10s. per buſhel; paid for divers charges 10l. how much per cent. is gained if it is ſold at $11\frac{1}{4}$s. per buſhel? Anſwer $10\frac{5}{17}$ per cent.

10. Sold certain merchandizes for 520l. and find I have made 120l. profit: I demand how much per cent. it is. Anſwer 30 per cent.

11. If 1 lb. of pepper is ſold for 18d. I find there is loſt 2d. per lb. how much is the loſs per cent? Anſwer 10 per cent.

12. When I ſell a lb. of ſilk for 26s. 6d. I gain 2s. 6d.; now I want to know how much I ſhould gain if I ſold a bale of ſilk which coſt 120l. Anſwer 12l. 10s.

III.

13. Bought 100 oranges at the rate of 6 for $4\frac{1}{2}$d. and ſold them at the rate of 5 for 3d.; tell me how much money is loſt, and how much is the loſs per cent. Anſwer, loſt 15d. or 20 per cent.

or. *d.* *or.* *d.*
If 6 —— $4\frac{1}{2}$ —— 100 comes 75 bought
If 5 —— 3 —— 100 comes 60 ſold
—
15 loſt
—

d. *d.* *d.*
If 75 —— 15 —— 100. Anſw. 20 per cent.

14. If 5 lemons are bought for 4d. and 4 lemons are ſold for 5d. how much is the profit upon the box, containing 200 lemons, and how much is it per cent.? Anſwer 7s. 6d. is $56\frac{1}{4}$ per cent.

15. Suppoſe 6 yards of ribbon coſt 28d. and is ſold at $5\frac{1}{4}$d. the yard; what is the profit at that rate upon a piece of 54 yards? Anſwer 2s. $7\frac{1}{2}$d.

16. Bought coffee at the rate of 21s. for 7 lb. ſold it at 3s. 4d. the lb.: how much is the profit at that rate upon a bale, weight 346 lb. and how much do I gain per cent.? Anſ. $11\frac{1}{9}$ per cent. or 5l. 15s. 4d.

IV.

17. A piece of ſerge 53 yards long coſt 5l. 1s. 7d. for how much muſt 1 yard be ſold, to gain by the whole piece 1l. 2s. 1d.? Anſwer, at 28d.

l. *s.* *d.*
5 1 7
1 2 1
yds. —————— *yd.* *d.*
If 53 —— 6 3 8 —— 1 Anſ. 28

18. If one yard of ſerge coſt 23d. for how much muſt a piece containing 53 yards be ſold, to gain 5d. a yard? Anſwer, for 6l. 3s. 8d.

19. How much would the former piece of ſerge come to, if it was ſold at 3d. per yard loſs? Anſwer 4l. 8s. 4d.

20. If 112 lb. of ſugar coſt 2l. 15s. and is ſold for 2½d. per lb. profit; how much muſt be received for the 112 lb.? Anſwer 3l. 18s. 4d.

21. Suppoſe the aforeſaid ſugar is ſold for ¾d. per lb. loſs; how much will then be received? Anſ. 2l. 8s.

22. If 1 lb. of pepper coſt 15d. for how much muſt a lb. be ſold, to gain upon 30 lb. as much as 5 lb. coſt? Anſwer 17½d.

V.

23. If 1 tun of wine coſt 40l. for how much muſt it be ſold to gain 6¼ per cent.? Anſwer 42l. 10s.

l.
100
6¼
l. —— l. l. s.
If 100 —— 106¼ —— 40 comes 42 10

Or thus:

l. l. l. l. s.
If 100 —— 6¼ —— 40 comes 2 10
40 0
Anſ. 42 10

24. At what rate muſt I ſell a hundred weight of madder which coſt 3l. 15s. to gain 10 per cent.? Anſwer 4l. 2s. 6d.

25. At what rate muſt the aforeſaid madder be ſold to loſe 10 per cent.? Anſwer 3l. 7s. 6d.

26. Bought 12 pieces of white cloth for 6l. 10s. per piece; paid 20s. 10d. per piece for dying: for how much muſt I ſell them a-piece, to gain 20 per cent.? Anſwer 9l. 1s.

27. For how much muſt I ſell the aforeſaid cloth a-piece, if I had a mind to gain upon the 12 pieces 100 qr. guineas of 5s. 3d. each? Anſwer 8l. 13s. 9d.

28. Suppoſe 900 lb. of any thing coſt 67l. 10s. at what rate muſt it be ſold a lb. to gain 2d. per lb.? Anſwer 20d.

VI.

29. Bought a tun of wine for 50l. ready money; ſold it for 54l. 10s. payable in 8 months time: I demand how much per cent. I gain at that rate per annum. Anſwer $13\frac{1}{2}$ per cent.

$$\begin{array}{ccccc}
 & & \textit{l.} & & \\
 & & 54\frac{1}{2} & & \\
\textit{l.} & & \underline{50} & & \textit{l.} \\
50 & & & & 100 \\
\textit{mon.} & > & 4\frac{1}{2} & < & \textit{mon.} \\
\underline{8} & & & & \underline{12} \\
400 & & & & 1200
\end{array}$$

Anſ. $13\frac{1}{2}$ per cent.

30. Suppoſe I bought rice for 3l. 15s. ready money, and ſold it for 4l. 6s. 3d. payable in 18 months: how much per cent. do I gain at that rate per annum? Anſwer, 10 per cent.

31. If a tun of tallow is bought for 32l. 10s. ready money, and ſold for 37l. 10s. payable in 9 months; tell me how much is the profit per cent. in 12 months. Anſwer, $20\frac{20}{39}$ per cent.

32. What is the profit per cent. in 12 months upon 300 lb. of coffee, which coſt 4s. 2d. the lb. ready money, and ſold for 5s. per lb. payable in 8 months. Anſwer 30 per cent.

33. A linen-draper buys 20 pieces of linen, each containing 45 yards, at 60s. per piece, for ready money; ſells them at 16d. per yard, payable in 6 months: how much is his profit or loſs? Anſwer, he loſes the uſe of his money for 6 months.

VII.

34. Bought 100 caſks of raiſins at 50s. per cwt. payable in 9 months; ſold them for 52s. per cwt. pay-

able in 15 months: what is the profit per cent. per ann. at that rate? Anſwer 8 per cent.

$$\begin{array}{cccccc}
\textit{ms.} & & & \textit{s.} & & \\
15 & & & 52 & & \\
\underline{9} & \textit{s.} & & \underline{50} & & \textit{s.} \\
6 & 50 & & & & 100 \\
 & \textit{mon.} & > & 2 & < & \textit{mon.} \\
 & \underline{6} & & & & \underline{12} \\
 & 300 & & & & 1200
\end{array}$$

Anſw. 8 per cent.

35. A vintner buys a parcel of brandy at 9s. 3d. per gallon, payable in 6 months; ſells the ſame at 9s. 10½d. per gallon, payable in 10 months: how much per cent. does he gain at that rate per annum? Anſwer $20\frac{10}{37}$ per cent.

36. If 1 cwt. of merchandizes is bought for 56s. payable in 9 months time, and ſold for 6¼d. per lb. payable in 12 months time; I demand what is gained per cent. in a year at that rate. Anſwer $16\frac{2}{3}$.

37. A tobacconiſt buys 10 hhds. of tobacco, weight neat 30 cwt. 3 qrs. 14 lb. at 9¼d. per lb. payable in 3 months; ſells it at 11d. half farthing, payable in 7 months: tell me how much per cent. per annum he gains at that rate. Anſwer $60\frac{30}{37}$.

VIII.

38. A merchant in England ſends to Ireland 11300 lb. of pewter, coſt 706l. 5s. Engliſh money; the charges over are 10l. 6s. 8d.: at what rate muſt I ſell it a lb. to gain 15l. per cent. allowing 12d. in England to make 13d. in Ireland? Anſwer 19d. very nearly, or exactly $18\frac{42483}{45200}$d.

If

	d.		d.		l.	s.		l.	s.	d.
If	12	—	13	—	706	5	comes	765	2	1
							Charges	10	6	8
							The whole coſt	775	8	9

	l.		l.		l.	s.	d.		l.	s.	d.
If	100	—	15	—	775	8	9	comes	116	6	$3\frac{3}{4}$
								£.	891	15	$0\frac{3}{4}$

	lb.		l.	s.	d.		lb.
If	11300	—	891	15	$0\frac{3}{4}$	—	1

Anſw. $18\frac{42483}{45200}$d.

39. A merchant receives from Liſbon 180 caſks of raiſins, which ſtand him here in 16s. each; trucks them againſt other merchandizes at 28s. per cwt.; finds he has made 25 per cent. profit: I demand the weight of each caſk, one with another. Anſw. 80 lb.

40. I ſell barley at 6s. per buſhel, and gain 20 per cent.; now if I ſell a parcel of the ſame barley, amounting to 3l. 15s. and find I gain 50 per cent. tell me how many buſhels were in the laſt parcel, and at what rate I ſold them. Anſwer, 10 buſhels, at $7\frac{1}{2}$s.

41. Received 3 pieces of holland, quantity, No 1, 42 ells at $15\frac{1}{4}$ ſtivers the ell; No. 2, 52 ells at $19\frac{3}{8}$ ſtivers the ell; No. 3, $64\frac{1}{2}$ ells at $20\frac{1}{2}$ ſtivers the ell: at how much muſt I ſell it the yard, one with another, to gain 20 per cent. allowing $10\frac{1}{2}$ ſtivers for 1s. ſterling, 3 yards making 4 ells? Anſwer, 2s. $10\frac{2962}{11095}$d.

IX.

42. A merchant ſends to Barbadoes 150 firkins of butter, weight 87 cwt. 3 qrs. $9\frac{1}{2}$ lb. at 37s. 4d. per cwt.; pays for duty and other charges 11l. 0s. 10d.; his correſpondent at Barbadoes ſells the butter at 8d. the lb. (weight as above) pays for freight, &c. 24l. 17s. 1d.; takes 5 per cent. for his commiſſion: I demand loſs or gain, if 135l. Barbadoes is worth but 100l. in England. Anſwer, 37l. 6s. $10\frac{26}{27}$d. profit.

cwt.	qr.	lb.		s.	d.		l.	s.	d.
87	3	$9\frac{1}{2}$	at	37	4	per cwt.	163	19	2
						Charges	11	0	10
						Firſt coſt	175	0	0

cwt.	qr.	lb.		d.			l.	s.	d.
87	3	$9\frac{1}{2}$	at	8	the lb.		327	18	4
	Charges £.			24	17	1			
	Commiſ.			16	7	11			
						£.	41	5	0
						The neat proceeds	286	13	4

	l.		l.		l.	s.	d.				
If	135	—	100	—	286	13	4	comes	212	6	$10\frac{26}{27}$
								The firſt coſt	175	0	0
								Profit	37	6	$10\frac{26}{27}$

43. Sent to Rotterdam 500 ſalt ox hides, weight neat 400 cwt. 2 qrs. 14 lb.; coſt 20s. 4d. per cwt.; paid for duty and other charges 15l. 10s. 3d.; when the hides arrived they weighed 39370 lb. and my correſpondent ſells them for 15 gilders the 100 lb. deducts for freight and other charges 650 gilders, $17\frac{4}{5}$ ſtivers, and for his commiſſion 2 per cent.: now tell me whether I gain or loſe, if I value each gilder at 2s. Anſwer, I gain 90l. 16s. $8\frac{1}{2}$d.

44. A merchant ſends to Bourdeaux 200 barrels of beef, which coſt him 30s. per barrel, and 200 caſks of butter, weight neat 300 cwt. 1 qr. at 40s. 8d. per cwt.; pays for duty and other charges 45l. 10s. 6d.; the correſpondent in Bourdeaux ſells the beef for 24 livres the barrel, and the butter for 40 livres the 100 lb. (wt. 33925 lb.) deducts for charges 1500 livres, and 2 per cent. for his commiſſion: now if the merchant values each livre at 16d. I requeſt to know whether he gets or loſes. Anſwer, he gains 244l. 2s. $9\frac{3}{5}$d.

45. A merchant in Ireland ſent to Liſbon 500 barrels of wheat, coſt $10\frac{1}{2}$s. per barrel, 100 firkins of butter,

weight 55 cwt. 1 qr. 7 lb. at 37s. 4d. per cwt. and 400 tanned hides, weight 106 cwt. 3 qrs. at 5¾d. per lb.; paid for duty and other charges 35l. 16s. 1d. and pays præmia of inſurance of 688l. at 16 per cent.; the wheat at Liſbon meaſured 5000 alquires, and is ſold at 300 res the alquire. The butter weighs 193 arobes and 19 lb. and is ſold at 160 res the lb. The leather weighs 373 arobes and 20 lb. and ſells for 150 res the lb.: the factor pays for duty and other charges 832 millres, 062 res, and charges for his commiſſion 3 per cent. The factor remits the neat proceeds to London, at 5s. 6d. per millre, and the merchant in Ireland draws it from England at 5 per cent advance: I deſire to know whether he gets or loſes by this cargo. Anſwer, he gains 161l. 14s. 6d.

Note. Every arobe is 32 lb.

46. A merchant in Corke ſends to Oſtend 20 hhds. of tallow, weight 10 tun, 17 cwt. 3 qrs. at 30l. 10s. 9d. the tun; pays for duty and other charges 25l. 10s. and for præmia of inſurance 55l. 10s.; the tallow arriving at Oſtend, weight 24388 lb. and the merchant there ſells it at 18 gilders the 100 lb.; pays for freight, duty and other charges 595 gilders, 10 ſtivers, 4 pennings, and reckons for his commiſſion 2 per cent. and remits the neat proceeds to London, at 33s. 9d. Flemiſh per pound ſterling, and the Corke merchant draws it from England at 4 per cent. advance: I deſire to know whether he gets or loſes. Anſwer, he loſes 32l. 15s. 1$\frac{855429}{1350000}$d.

CHAP. XXVI.

EQUATION OF PAYMENTS,

Is when ſeveral ſums of money to be paid at different times, are reduced to a mean time for the payment of the whole without loſs to the debtor or creditor; and is commonly found by this rule.

Multiply each payment by its time, and divide the ſum of all the products by the whole debt, and the quotient is the equated time.

EXAMPLES.

1. A. owes B. 100l. whereof 50l. is to be paid at 2 months, and 50l. at 4 months; but they agree to reduce them to one payment: when muſt the whole be paid? Anſwer, 3 months.

$$\begin{array}{lcl}
\text{l.} & \qquad & \text{l.} \\
50 & & 50 \\
2 \text{ months.} & & 4 \text{ months.} \\
\hline
100 & & 200 \\
\hline
\end{array}$$

$$\text{add}\left\{\begin{array}{l}200\\100\end{array}\right.$$

$$\begin{array}{rl}
& \underline{}\ \text{months.} \\
\text{The debt } 100\ ) & 300\ (\ 3 \quad \text{Anſw.} \\
& \underline{300}
\end{array}$$

2. A merchant hath owing him 300l. to be paid as follows: 50l. at 2 months, 100l. at 5 months, and the reſt at 8 months; and it is agreed to make one payment of the whole: I demand when that time muſt be. Anſwer 6 months.
3. F. owes to H. 1000l. whereof 200l. is to be paid preſent, 400l. at 5 months, and the reſt at 10 months; but they agree to make one payment of the whole: I demand the equated time. Anſw. 6 months.
4. K. is indebted to L. a certain ſum, which is to be diſcharged at 4 ſeveral payments, that is, $\frac{1}{4}$ at 2 months, $\frac{1}{4}$ at 4 months, $\frac{1}{4}$ at 6 months, and $\frac{1}{4}$ at 8 months; but they agreeing to make one payment of the whole, the equated time is therefore demanded. Anſwer 5 months.
5. H. bought of X. a quantity of goods upon truſt, for which H. was to pay $\frac{1}{3}$ of the debt every three months

till the whole ſhould be diſcharged; but they afterwards agreed to pay the whole at one equated time: the time is demanded. Anſwer 6 months.

6. W. owes Z. a ſum of money, which is to be paid $\frac{1}{2}$ preſent, $\frac{1}{4}$ at 4 months, and the reſt at 8 months: what is the equated time for the whole? Anſwer 3 months.
7. A. owes B. 2000 l. to be paid three months hence; but A. agrees to pay him 1200l. down, provided he will give him a longer time for the payment of the remainder. The queſtion is, how long time B. ought to give him to pay the other 800l in? Anſwer $7\frac{1}{2}$ months.
8. A merchant bought a quantity of cloth upon truſt, to the amount of 600l. to be paid as follows, *viz.* $\frac{1}{2}$ in 4 months, $\frac{1}{4}$ in 8 months, and the reſt in 12 months; but they agreed to have but one payment of the whole: I demand the equated time. Anſ. 7 months.

CHAP. XXVII.

SECT. I.

REBATE, OR DISCOUNT,

Is when merchants ſell their commodities upon time, and afterwards both parties do agree that this money ſhall be paid in before it is due, allowing at the rate of a certain intereſt per annum, and the money ſo paid or received before due, being put out to uſe (at the rate of the diſcount agreed on, till the time it was due) muſt amount to the juſt ſum that would be then due.

EXAMPLE.

1. A merchant buys certain merchandizes, to the value of 648l. payable in 12 months: to know how much ready money he is to pay the rebate at 8 per cent. per annum. Anſwer 600

l.
100
8
―――
If 108 —— 100 —— 648 Anſ. 600 ready money.
48 Rebate.
―――
648
―――

2. How much is the rebate of 7080l. 15s. in 12 months, at 8 per cent. per ann.? Anſwer 524l. 10s.
3. How much is the rebate of 100l. for 12 months, at 8 per cent. per annum? Anſwer 7l. 8s. $1\frac{7}{9}$d.
4. I demand how much ready money I muſt pay for 432l. 14s. for 12 months rebate, at 7 per cent. per annum. Anſwer 404l. 7s. $10\frac{2}{107}$d.
5. What is the rebate of 45l. 15s. 6d. for 12 months, at 6 per cent. per annum? Anſwer 2l. 11s. $9\frac{45}{53}$d.

II.

6. How much is the rebate of 530l. in 9 months, at 8 per cent. per annum? Anſwer 30l.

m. *per cent.* *m.*
If 12 —— 8 —— 9 comes 6
l.
6
100
―――
If 106 —— 6 —— 530 Anſwer 30

7. How much is the rebate of 308l. 15s. in 18 months, at 8 per cent. per annum? Anſwer 33l. 1s. $7\frac{2}{7}$d.
8. Tell me the rebate of 112l. 12s. in 20 months, at 7 per cent. per annum? Anſwer 11l. 15s. $3\frac{27}{67}$d.
9. W. is indebted 273l. 10s. payable in 21 months: I demand how much ready money he is to pay, the rebate at 6 per cent. per annum.? Anſwer 247l. 10s. $2\frac{158}{221}$d.
10. Some merchandizes being bought for 5150l. with $4\frac{1}{2}$ months rebate, at 8 per cent. per annum, beſides 1 per

1 per cent. for prompt payment; I want to know how much ready money it comes to. Anſw. 4950l.

III.

11. A. is indebted to B. 432l. payable in 12 months, and 580l. payable in 2 years: now if A. has a mind to pay both theſe ſums immediately, the rebate at 8 per cent. per annum, how much muſt he pay? Anſwer 900l.

In 1 year.

	l.		l.		l.		l.
If	108	——	100	——	432	comes	400

In 2 years.

	l.		l.		l.		l.
If	116	——	100	——	580	comes	500
						Anſ. £.	900

12. What is the rebate of 756l. the one half payable in 6 months, and the other half in 6 months after that, at 7 per cent. per annum? Anſ. 37l. 10s. $2\frac{1518}{2461}$d.

13. How much ready money muſt one pay for 1000l. of which 300l. is payable in 1 year, and 300l. in 2 years, and the reſt in three years, diſcounting 8 per cent. per annum? Anſwer $858\frac{7922}{8091}$l.

14. A. owes B. 2000l. of which 690l. is to be paid in 15 months, 350l. in 18 months, 710l. in 21 months, and the remainder in 24 months: I demand how much ready money he muſt pay, rebating 8 per cent. per annum. Anſwer $1778\frac{3527}{36366}$l. or 1778l. 1s. $11\frac{5031}{18183}$d.

IV.

15. A merchant is indebted 2163l. 3s. payable in 12 months: I demand how much he muſt pay, if he pays it at the expiration of 5 months, diſcounting at the rate of 6 per cent. per annum. Anſw. 2090l.

m.
12
5
m. l. — l.
If 12 — 6 — 7 comes $3\frac{1}{2}$
100
—— l. l. s. l.
If $103\frac{1}{2}$ — 100 — 2163 3 Anſ. 2090

16. If the above ſum was paid in 3 months, how much ought he then to pay, rebate as before? Anſw. 2070l.

17. A merchant owes 110l. payable in 20 months, and 224l. payable in 24 months; the firſt ſum he pays in 5 months, and the other 1 month after that, diſcounting 8 per cent. per annum: I demand the ſum he paid. Anſwer 300l.

18. A. is to pay on the 7th of April, 1773, 5927l. and the 19th of June afterwards 5989l.: how much is he to pay, if he pays both theſe ſums the 24th of January, 1773, diſcounting at the rate of 16 per cent. per annum? Anſwer 11371l. 19s. $6\frac{1994}{5719}$d.

CHAP. XXVIII.

ALLIGATION MEDIAL,

Teaches how to find a mean in the price, quantity, or quality, relating to the mixture of merchandizes, as corn, wine, metals, medicines, &c. one with another.

RULE.

As the ſum of all the quantities, is to the ſum of their rates; ſo is any part of their mixture to the mean, rate, or price.

EXAMPLE.

EXAMPLE.

1. A goldſmith has 18 lb. of ſilver bullion of 8 ounces fine, melts that with 24 lb. of bullion of 10 ounces fine: I demand how fine each lb. of the mixture is. Anſwer $9\frac{1}{7}$ ounces.

	lb.	*oz.*		*oz.*		
	18	of 8	——	144		
	24	of 10	——	240		
	—			—		*lb.*
If	42		————	384	————	1 Anſ. $9\frac{1}{7}$ oz.

2. A farmer mingled 19 buſhels of wheat at 6s. per buſhel, and 40 buſhels of rye at 4s. per buſhel, and 12 buſhels of barley at 3s. per buſhel, together: I demand what a buſhel of this mixture is worth. Anſw. 4s. $4\frac{28}{71}$d.

3. A farmer mingled 20 buſhels of oats at 2s. per buſhel, and 30 buſhels of beans at 2s. per buſhel, and 20 buſhels of peas at 3s. per buſhel together: I demand the worth of a buſhel of this mixture. Anſ. 2s. $3\frac{3}{7}$d.

4. A vintner mingled 5 gallons of Canary, at 8s. per gallon, and 6 gallons of Malaga, at 7s. per gallon, and 4 gallons of white wine, at 6s. per gallon, together: I demand what a gallon of this mixture is worth. Anſwer, 7s. $0\frac{4}{5}$d.

5. A grocer mingled 2 cwt. of ſugar, at 56s. per cwt. and 1 cwt. at 43s. per cwt. and 2 cwt. at 50s. per cwt. together: I demand the price of 3 cwt. of this mixture. Anſwer 7l. 13s.

6. An alehouſekeeper mixed three ſorts of ale together, *viz.* 6 gallons at 12d. per gallon, 8 gallons at 14d. per gallon, and 10 gallons, at 18d. per gallon: I demand what 1 gallon of this mixture is worth. Anſw. $15\frac{1}{6}$d.

7. A refiner having 5 lb. of ſilver bullion of 8 oz. fine, 10 lb. of 7 oz. fine, and 15 lb. of 6 oz. fine, would melt all together: I demand what fineneſs 1 lb. of this maſs ſhall be. Anſwer 6 oz. 13 dwts. 8 grs. fine.

8. A mint maſter hath 3 lb. weight of gold of 22 caracts fine, and 3 lb. of 20 caracts fine: I demand what fineneſs an oz. of this mixture will bear. Anſwer 21 caracts.

9. An oſtler mixing provender for his horſes, would put in a quantity of beans at 5s. per buſhel, with the like quantity of oats, at 3s. 6d. per buſhel: I demand the price of a buſhel of this mixture. Anſw. 4s. 3d.

10. A maltſter hath ſeveral ſorts of malt, *viz.* one ſort at 4s. 6d. another at 4s. and a third at 3s. 6d. per buſhel, and he would mix an equal quantity of each together: I demand the price of a buſhel of this mixture. Anſwer 4s.

11. A brewer had ſeveral ſorts of ale, *viz.* one ſort at 20s. per barrel, another at 25s. a third at 30s. and a fourth at 35s. per barrel; and he would mix an equal quantity of each together: I demand the price of a barrel, and alſo of a gallon of this mixture. Anſwer 27s. 6d. per barrel, and $10\frac{5}{16}$d. per gallon.

CHAP. XXIX.

SECT. I.

ALLIGATION ALTERNATE,

Shews the due proportion of ingredients in any mixture, when the particular rates of the ingredients and mean rates are given, being (as it were) the converſe to Alligation Medial, and admits of three caſes.

CASE I.

The particular rates of any ingredients propoſed to be mixed, and the mean rate of the whole mixture being given; to find how much of each ingredient is requiſite to compoſe the mixture, when the whole quantity or any part thereof is not limited.

EXAMPLE.

1. How much wheat at 6s. the buſhel, and barley at 3s. 8d. the buſhel, will make a mixture that may ſtand

in 4s. 4d. the buſhel? Anſwer 8 buſhels of wheat, and 20 buſhels of barley.

RULE.

Take the differences between the mean rate, and the particular rates, and ſet them down alternately, and they will be the quantities required.

d.	*Extr. pri.* d.	*Alt. diff.*		d.		*proof.*
Mean pri. 52 <	72	8 buſh.	at	72	is	576
	44	20 buſh.	at	44	is	880
		28 buſh.	at	52	is	1456

Note. The queſtions in this, and all the other ſections, except the 4th and 7th, admit of more anſwers than one, and yet all true; for although in the foregoing queſtion, 8 and 20 do anſwer it, yet there are innumerable other numbers that are in the ſame proportion to one another, as 8 to 20, that will anſwer the queſtion; and though common Arithmetick will not obtain all the poſſible anſwers which the queſtions in thoſe ſections are capable of, nor often thoſe which beſt ſuit the purpoſe, yet by an algebraick way of reaſoning may be obtained all the poſſible anſwers to any queſtion in this rule.

2. How much tobacco of 15d. the lb. and 19d. the lb. muſt be mixed ſo that it will ſtand in 18d. the lb.? Anſwer 1 lb. at 15d. and 3 lb. at 19d.
3. What quantity of ſugar at 11d. the lb. and 7¼d. the lb. would make a mixture, ſo that it would ſtand in 10¼d. the lb.? Anſwer 3 lb. at 11d. the lb. and ¾ lb. at 7¼d. the lb.
4. How many ounces of ſilver of 11 oz. fine, and 8 oz. fine, muſt be melted together to make the maſs or mixture 9 oz. fine? Anſwer, 1 oz. of 11 oz. fine, and 2 oz. of 8 oz. fine.

II.

5. A merchant has ſugar of 5d. 10d. and 12d. the lb. how much of each ſort muſt he take, that he may ſell a lb.

a lb. for 8d.? Anſwer, 6 lb. at 5d. 3 lb. at 10d, and 3 lb. at 12d. the lb.

Rule.

Join the ſingle extreme to all the other extremes, and proceed as before.

		Anſw.		*d.*		*Proof.*
8	5	..4 and 2 is 6	at	5	is	30
	10	3	at	10	is	30
	12	3	at	12	is	36
		lb. 12	at	8	is	96

6. How much ſack of 6s. the gallon, and white wine of 4s. the gallon, and ſherry of 4s. 9d. the gallon, would be wanted to make a mixture, ſo that a gallon may ſtand in 4s. 6d.? Anſwer, 6 gallons, at 6s. 6 gallons at 4s. 9d. and 21 gallons at 4s.
7. A merchant has wheat of 5s. 10d. the buſhel, and barley at 4s. 2d. the buſhel, and rye of 3s. the buſhel: how many buſhels of each ſort muſt he take to make a mixture, ſo that the buſhel may ſtand in 5s. 5d? Anſwer, 44 at 5s. 10d. 5 at 4s. 2d. and 5 at 3s.
8. A vintner has brandy at 3s. 5s. and 6s. the gallon, and has a mind to mix a quantity of them together, ſo that it may ſtand him at 5s. 6d. the gallon: I demand how many gallons he muſt take of each ſort. Anſwer, $\frac{1}{2}$ at 3s. $\frac{1}{2}$ at 5s. and 3 at 6s.

III.

9. A grocer had ſugar of 5d. 7d. 12d. and 13d. the lb. and mixt of each a certain quantity together, and found it ſtood him in 10d. the lb.; I demand how many lb. he took of each ſort. Anſwer, 3 lb. of 5d. 2 lb. of 7d. 3 lb. of 12d. and 5 lb. of 13d.; or otherways.

Rule.

Join two extremes together, no matter which, ſo that one be bigger than the mean, and the other leſs, and ſet their differences down as before.

EXAMPLE.

Proof.

				d.	l.	s.	d.
10	5	Anſw.	3 lb. at	5 is	0	1	3
	7	—	2 lb. at	7 is	0	1	2
	12	—	3 lb. at	12 is	0	3	0
	13	—	5 lb. at	13 is	0	5	5
			13 lb. at	10 is	0	10	10

Or thus:

				d.	l.	s.	d.
10	5	Anſw.	2 lb. of	5 is	0	0	10
	7	—	3 lb. of	7 is	0	1	9
	12	—	5 lb. of	12 is	0	5	0
	13	—	3 lb. of	13 is	0	3	3
			13 lb. of	10 is	0	10	10

10. A wine merchant has four ſorts of wine, viz. of 20d. 16d. 12d. and 7d. the quart; how much of each ſort muſt he take to ſell a quart for 14d? Anſwer, 6 quarts of 7d. 2 quarts of 12d. 2 quarts of 16d. and 7 quarts of 20d.; or otherwiſe.

11. A goldſmith has gold of 17, 18, 22, and 24 caracts fine; how much muſt he take of each to make it 21 caracts fine? Anſwer, 3 caracts of 17 caracts fine, 1 caract of 18 caracts fine, 3 caracts of 22 caracts fine, and 4 caracts of 24 caracts fine.

CASE II.

ALLIGATION PARTIAL.

The particular rates of all the ingredients propoſed to be mixed, the mean rate of the whole mixture, and any one of the quantities to be mixed being given; thence to find how much of every one of the other ingredients is requiſite to compoſe the mixture.

IV.

12. A refiner has ſilver bullion of 9 oz. fine; I demand how much alloy muſt be put to it to bring it to 7 oz. fine. Anſwer, $3\frac{3}{7}$ oz.

Note. Set down all the particulars, and find their differences, as before, without any regard to the maſs or quantity to be mixt, which here is 12; becauſe a pound, or 12 oz. of ſilver being tried a certain time in the fire, loſing nothing in weight, is eſteemed 12 oz. fine; and if it loſes 3 oz. it is called 9 oz. fine; and if it loſes 2 oz. it is called 10 oz. fine, &c.

RULE.

As the difference ſtanding againſt the quantity given, is to the quantity or mixture given; ſo is any other difference to the quantity ſought.

Note. The (o) ſtands here for alloy.

$$7 < \begin{array}{c|c} 0 & 2 \\ 9 & 7 \end{array} \text{ — } 12 \text{ — } 2. \quad \text{Anſwer, } 3\tfrac{3}{7}.$$

Proof.

Silver, 9 oz.

Alloy, 3 oz.

12

Alloy added $3\frac{3}{7}$

If $15\frac{3}{7}$ — 9 — 12 comes 7 oz.

13. How much alloy muſt be put to bullion of $10\frac{4}{5}$ oz. fine, to bring it to $7\frac{1}{4}$ oz. fine? Anſwer, $5\frac{127}{145}$ oz.

14. How much alloy muſt be put to gold of $21\frac{5}{8}$ caracts, to bring it to $17\frac{1}{2}$ caracts fine? Anſwer, $5\frac{23}{35}$ caracts.

Note. An ounce of gold being tried in the fire, loſing nothing in weight, is called 24 caracts fine; but if it loſes 3 caracts, it is called 21 caracts fine; and if it loſes 4, it is called 20 caracts fine, &c.

15. How much water muſt I mix with 63 gallons of brandy, of 5s. 5d. the gallon, ſo that it may ſtand in 4s. 6d. the gallon? Anſwer, $12\frac{5}{6}$ gallons.

16. How much wheat, of 6s. the buſhel, muſt be mixed with 12 buſhels of barley, at 3s. 8d. the buſhel, ſo that

the whole mixture may ſtand in 4s. 4d. the buſhel? Anſwer, $4\frac{4}{5}$ buſhels.

V.

17. How much braſs of 14d. and pewter of $10\frac{1}{2}$d. the lb. muſt I melt with 50 lb. of copper, worth 16d. the lb. ſo that the whole mixture may ſtand in 1s. the lb.? Anſwer, 200 lb. at $10\frac{1}{2}$d. and 50 lb. at 14d.

$$\begin{array}{c}d.\\ \end{array} 12\left\{\begin{array}{l}10\frac{1}{2}\\ 14\\ 16\end{array}\right|\begin{array}{l}-6\\ -1\frac{1}{2}\\ -1\frac{1}{2}\end{array} — 50<\begin{array}{l}6\\ 1\frac{1}{2}\end{array}\left|\begin{array}{l}\text{Anſwer.}\\ \text{200 lb. at }10\frac{1}{2}\text{d.}\\ \text{50 lb. at 14d.}\end{array}\right.$$

Proof.

lb.		*d.*		*d.*
200	at	$10\frac{1}{2}$	is	2100
50	at	14	is	700
50	at	16	is	800

$$\text{If } 300 \;——\; 3600 \;——\; \overset{\text{lb.}}{1} \text{ comes } \overset{d.}{12}.$$

18. How much gold of 21 and 23 caracts fine muſt be mixed with 30 oz. of 20 caracts fine, to bring it to 22 caracts fine? Anſwer, 30 of 21, and 90 of 23.

19. With 60 gallons of brandy, at 6s. the gallon, I mixed brandy of 5s. 4d. the gallon, and ſome water; then I found it ſtood me in 3s. 6d. the gallon; I demand how much brandy, and how much water I took. Anſw. 60 gallons, at 5s. 4d. and $74\frac{2}{7}$ gallons of water.

VI.

20. How much Malaga, of 7s. 5d. the gallon, and ſherry, of 5s. 2d. the gallon, and white wine, at 4s. 2d. the gallon, muſt be mixed with 20 gallons of Canary, at 6s. 8d. the gallon, ſo that one gallon of the mixture may ſtand in 6s.? Anſwer, 44 gallons, at 7s. 5d. 16 gallons, at 5s. 2d. and 34 gallons, at 4s. 2d.

$$72\left\{\begin{array}{l}89\\ 62\\ 50\\ 80\end{array}\right|\begin{array}{l}—\ 22\\ —\ 8\\ —\ 17\\ —\ 10\end{array} —— 20<\begin{array}{l}22\\ 8\\ 17\end{array}\Big|\ \text{Anſw.}\left\{\begin{array}{l}44\\ 16\\ 34\end{array}\right.$$

Proof.

	d.	d.
44 at	89 is	3916
16 at	62 is	992
34 at	50 is	1700
20 at	80 is	1600

If 114 ——— 8208 —— 1 comes 72 d.

21. How much alloy, and how much gold of 21 and 23 caracts fine, muſt be put to 30 oz. of 20 caracts fine, to bring it to 18 caracts fine? Anſwer, $16\frac{2}{3}$ oz. alloy, 30 oz. of 21, and 30 oz. of 23 caracts fine.

22. How do you prove the above anſwer to be right? Anſwer, thus:

oz.		Car.
$16\frac{2}{3}$	Alloy	
30	of 21 is —	630
30	of 23 is —	690
30	of 20 is —	600

If $106\frac{2}{3}$ ——— 1920 —— 1 comes 18 Car. fine.

23. How much lead of $2\frac{1}{2}$d. the lb. pewter of 10d. the lb. and braſs of 16d. the lb. muſt I melt, or mix with 112 lb. of copper, at 18d. the lb. ſo that 1 lb. of this mixture may ſtand me in 12d.? Anſwer, 224, at $2\frac{1}{2}$d. the lb. 336, at 10d. and 532, at 16d. the lb.

VII.

24. How much fine ſilver muſt be put to bullion of $8\frac{1}{2}$ oz. fine, to bring it to 10 oz. fine? Anſwer, 9 oz.

RULE.

As the difference of the greater fineneſs and the maſs, is to the difference of the leſſer fineneſs and the greater; ſo is the maſs or quantity to the quantity required.

$$12 < \begin{matrix} 10 \\ 8\frac{1}{2} \end{matrix} \left| \begin{matrix} 1\frac{1}{2} \\ 2 \end{matrix} \right. \text{ — } 1\frac{1}{2} \text{ — } 12. \quad \text{Anſw. 9 oz.}$$

Or thus:

Subtract the fineneſs one from another, the remainder multiply by the maſs or quantity; that product divide by the difference of the maſs and the greater fineneſs, and you have the fineneſs required.

Greater fineneſs 10
Leſſer $8\frac{1}{2}$
———
$1\frac{1}{2}$
12
———
Difference between the maſs and greater fineneſs } 2) 18 (9 oz.
18
—

Proof.
Bullion 12 fine $8\frac{1}{2}$
Fine 9 fine 9
— —
If 21 — $17\frac{1}{2}$ — 12 comes 10 oz.

25. A refiner has 28 lb. of ſilver bullion, of $8\frac{1}{2}$ oz. fine; how much fine ſilver muſt he put to it to bring it to 10 oz. fine? Anſwer, 21 lb.

26. A goldſmith has gold of $19\frac{1}{3}$ caracts fine; how much fine gold muſt he put to it to bring it to $23\frac{1}{2}$ caracts fine? Anſwer, 200 caracts.

CASE III.

ALLIGATION TOTAL.

The particular rates of all the ingredients propoſed to be mixed, and the ſum of all their quantities, with the mean rate of that ſum being given, to find the particular quantities of the mixture.

VIII.

27. A tobacconiſt has two ſorts of tobacco, viz. of 18d. and 9d. the lb. and has a mind to mix 112lb. ſo that it may ſtand him in 16d. the lb. I demand how much he muſt take of each. Anſwer, $87\frac{1}{9}$ lb. of 18d, and $24\frac{8}{9}$ lb. of 9d.

RULE.

As the ſum of all the differences is to the ſum of all the quantities given, ſo is every particular difference to its particular quantity.

$$16<\begin{matrix}18\\9\end{matrix}\left|\begin{array}{c}7\\2\\\hline 9\end{array}\right. — 112<\begin{array}{l}7\text{ comes }87\frac{1}{9}\\2\text{ comes }24\frac{8}{9}\\\hline \quad\quad\quad\; 112\end{array}$$

Proof.

lb.		*d.*		*d.*
$87\frac{1}{9}$	at	18	is	1568
$24\frac{8}{9}$	at	9	is	224

If 112 —— 1792 — 1 lb. Anſwer, 16d.

28. A goldſmith has two ſorts of ſilver bullion, the one of 10 oz. fine, and the other of 5 oz. fine, and has a mind to mix a lb. of it, ſo that it ſhall be 8 oz. fine: I demand how much he muſt take. Anſwer, $4\frac{4}{5}$ of 5 oz. fine, and $7\frac{1}{5}$ of 10 oz. fine.

29. A grocer has ſugar of 12d. the lb. and of $6\frac{1}{2}$d. the lb. and has a mind to mix two hundred weight of it, ſo that he may ſell it at 8d. the lb.: I demand how much of each ſort he muſt take. Anſwer, $162\frac{10}{11}$lb. of $6\frac{1}{2}$d. and $61\frac{1}{11}$lb. at 12d.

30. A refiner has ſilver of $11\frac{1}{2}$ oz. fine, and of 7 oz. fine, and has a mind to make up a piece of work, requiring 35 lb. of $9\frac{3}{4}$ oz. fine: how much muſt he take of each? Anſwer, $21\frac{7}{18}$ lb. of $11\frac{1}{2}$ oz. fine, and $13\frac{11}{18}$ lb. of 7 oz. fine.

31. Brandy of 3s. 6d. and 5s. 9d. the gallon, is ſo to be mixt that a hhd. of 63 gallons may be ſold for 12l. 12s. I demand how many gallons muſt be taken of each. Anſwer, 14 gallons of 5s. 9d. and 49 gallons of 3s. 6d.

IX.

32. A grocer had ſugar of 12d. 10d. and 5d. the lb. and mixt 112 lb. of it, and then he found it ſtood him in 8d. the lb.: I demand how many lb. he took of

each ſort. Anſwer, 28 lb. of 12d. 28 lb. of 10d. and 56 lb. of 5d.

$$\begin{array}{r} \\ 8 \\ \\ \\ \\ \end{array}\left\{\begin{array}{r|r} d. & \\ 12 & \cdots\cdots\cdots\; 3 \\ 10 & \cdots\cdots\cdots\; 3 \\ 5 & 4 \text{ and } 2 \text{ is } 6 \\ \hline & 12 \end{array}\right.$$

Proof.

	lb.		lb.		d.		l.	s.	d.
112	3		28	at	12	is	1	8	0
	3		28	at	10	is	1	3	4
	6		56	at	5	is	1	3	4
			112	at	8	is	3	14	8

33. A vintner has 3 ſorts of wine, *viz.* of 24d. 22d. and 18d. the gallon; now he has a mind to mix a caſk of 60 gallons, ſo that he may ſell it at 20d. the gallon: how much muſt he take of each? Anſwer, 12 at 24d. 12 at 22d. and 36 at 18d.

34. A goldſmith has 3 ſorts of ſilver, *viz.* of 11, 8, and 5 oz. fine, and has a mind to make a piece of work that ſhall weigh 10 lb. of 9 oz. fine: how much of each muſt he take? Anſwer $5\frac{5}{9}$ lb. of 11 oz. fine, $2\frac{2}{9}$ lb. of 8 oz. fine, and $2\frac{2}{9}$ lb. of 5 oz. fine.

35. A caſk of 58 gallons is filled with liquor of 7d. 8d. and 10d. the gallon, and then it ſtands in $9\frac{1}{4}$d. the gallon: I would know how many gallons of each ſort was taken. Anſwer $40\frac{6}{10}$ gallons of 10d. $8\frac{7}{10}$ gallons of 8d. and $8\frac{7}{10}$ gallons of 7d.

X.

36. A merchant has brandy of 3, 5, 6 and 7s. the gallon, and has a mind to fill a caſk of 40 gallons, ſo that he may ſell it at 5s. 6d. the gallon: how many gallons muſt he take of each? Anſwer,

$$5\tfrac{1}{2}\left\{\begin{array}{r|l} 3 & \cdots\; 0\tfrac{1}{2} \\ 5 & \cdots\; 1\tfrac{1}{2} \\ 6 & \cdots\; 2\tfrac{1}{2} \\ 7 & \cdots\; 0\tfrac{1}{2} \\ \hline & \quad\;\; 5 \end{array}\right.$$

5 —— 40

	Anſ.		s.		Proof. l.	s.	d.
$0\frac{1}{2}$	4	at	3	is	0	12	0
$1\frac{1}{2}$	12	at	5	is	3	0	0
$2\frac{1}{2}$	20	at	6	is	6	0	0
$0\frac{1}{2}$	4	at	7	is	1	8	0
	40	at	$5\frac{1}{2}$	is	11	0	0

Or this way:

$$5\tfrac{1}{2}\left\{\begin{array}{l|l} 3 & \dots 1\tfrac{1}{2} \\ 5 & \dots 0\tfrac{1}{2} \\ 6 & \dots 0\tfrac{1}{2} \\ 7 & \dots 2\tfrac{1}{2} \end{array}\right. \qquad \frac{\quad}{5} \;\text{——}\; 40\left\{\begin{array}{l|l} 1\tfrac{1}{2} & 12 \text{ at } 3 \text{ is} \\ 0\tfrac{1}{2} & 4 \text{ at } 5 \text{ is} \\ 0\tfrac{1}{2} & 4 \text{ at } 6 \text{ is} \\ 2\tfrac{1}{2} & 20 \text{ at } 7 \text{ is} \end{array}\right.$$

Anſw.				Proof.		
		s.		*l.*	*s.*	*d.*
12	at	3	is	1	16	0
4	at	5	is	1	0	0
4	at	6	is	1	4	0
20	at	7	is	7	0	0
40	at	5½	is	11	0	0

37. A tobacconiſt has tobacco of 5½d. 7¾d. 12½d. and 15¼d. the lb. makes up four boxes of them of 22 lb. each, ſo that it ſtands him in 9¼d. the lb.: I want to know how many pounds he took of each ſort. Anſ. $22\frac{22}{29}$ lb. of 15¼d. $9\frac{3}{29}$ lb. of 12½d. $19\frac{21}{29}$ lb. of 7¾d. and $36\frac{12}{29}$ lb. of 5½d. or otherways.

38. A merchant has certain merchandizes, ſome of 9d. ſome of 12d. ſome of 24d. and ſome of 30d. the lb. how much of each ſort muſt he take to make up 99 lb. ſo that they may ſtand him in 20d. the lb.? Anſ. 24 lb. of 30d. 33 lb. of 24d. 30 lb. of 12d. and 12 lb. of 9d. or otherways.

39. A druggiſt has drugs of 18, 15, 12, 9, 8, and 5d. the lb.: how much muſt he take of each ſort to make up 318 lb. ſo that they may ſtand him in 11d. the lb.? Anſwer, $82\frac{22}{23}$ lb. of 18d. $41\frac{11}{23}$ lb. of 15d. $27\frac{15}{23}$ lb. of 12d. $13\frac{19}{23}$ lb of 9d. $55\frac{7}{23}$ lb. of 8d. and $96\frac{18}{23}$ lb. of 5d. or otherways.

40. It is required to make up 120l. to conſiſt of 120 pieces, *viz.* of moidores of 27s. guineas of 21s. and piſtoles of 18s. Quere, how many of each muſt be taken to make up the ſaid ſum of 120l.? Anſwer 20 at 27s. 20 at 21s. and 80 at 18s. each.

CHAP. XXX.

ARITHMETICAL PROGRESSION,

Is when ſeveral numbers have equal differences; as 1, 2, 3, 4, differ by one; or 2, 4, 6, 8, differ by 2.

RULE.

When the two extremes, and the number of terms in any ſeries of numbers in Arithmetical Progreſſion are given, and the ſum of all the terms is required, then multiply the ſum of the two extremes by half the number of terms.

Or otherways :

Multiply half the ſum of the extremes by the whole number of terms, the product is the total of all the terms.

EXAMPLE.

1. How many ſtrokes does the hammer of a clock ſtrike in 12 hours ? Anſwer 78.

$\left.\begin{array}{r}12\\1\end{array}\right\}$ The two extremes.

13 Their Sum.
6 Half the number of terms.

Anſw. 78

2. A merchant hath ſold 100 yards of ſuperfine cloth, *viz.* the firſt yard for 1s. the ſecond for 2s. the third for 3s. &c. : I demand how much he received for the ſaid cloth. Anſwer 252l. 10s.
3. Bought 19 yards of ſhalloon, and gave 1d. for the firſt yard, 3d. for the ſecond, 5d. for the third, &c. increaſing 2d. every yard : I demand what I gave for the 19 yards. Anſwer 1l. 10s. 1d.
4. A mercer ſold 20 yards of ſilk, at 3d. for the firſt yard, 6d. for the ſecond, 9d. for the third, &c. increaſing 3d. every yard : I demand what he ſold the 20 yards for. Anſwer 2l. 12s. 6d.
5. A butcher bought 100 head of cattle, *viz.* oxen, and gave for the firſt ox 1 crown, for the ſecond ox 2 crowns, for the third ox 3 crowns, &c. : I demand what the cattle coſt him. Anſwer 1262l. 10s.
6. Admit 100 ſtones were laid 2 yards diſtant from each other in a right line, and a baſket placed 2 yards from

the firſt ſtone: I demand how many miles a man ſhall go in gathering them ſingly into the baſket. Anſwer 11 miles, 3 furlongs, 180 yards.

7. A merchant ſold 1000 yards of linen at 2 pins for the firſt yard, 4 for the ſecond, 6 for the third, &c. increaſing 2 pins for every yard; I demand how much the linen produced when the pins were afterwards ſold at 12 for a farthing? Alſo, whether the ſaid merchant gained or loſt by the ſale thereof, and how much, ſuppoſing the ſaid linen to have been bought at 6d. per yard.

		l.	*s.*	*d.*
Anſwer	The linen produced	86	17	10
	The merchant gained	61	17	10

C H A P. XXXI.

GEOMETRICAL PROGRESSION,

Is when any rank or ſeries of numbers increaſes by one common multiplier, or decreaſes by one common diviſor, thoſe numbers are continued in Geometrical Progreſſion; as 3, 6, 12, 24, increaſe by the multiplier 2; and 24, 12, 6, 3, decreaſe by the diviſor 2.

Rule.

When all the terms alone are given, then from the product of the ſecond and laſt term, ſubtract the ſquare of the firſt term; that remainder being divided by the ſecond term, leſs the firſt, will give the ſum of all the terms.

Or otherways:

When the two extremes and the ratio are only given, then multiply the laſt term into the ratio, and from that product ſubtract the firſt term, that remainder divide by the ratio, leſs an unit or 1, the quotient is the ſum of all the terms.

EXAMPLE.

EXAMPLE.

1. A man bought a horſe, and by agreement was to give a farthing for the firſt nail, 2 for the ſecond, 4 for the third, &c. there were 4 ſhoes, and 8 nails in each ſhoe: I demand what the horſe was worth at that rate. Anſwer 4473924l. 5s. 3¾d.

0,	1,	2,	3,	4,	5,	6,	7,	8,	9,	10,	11,
1,	2,	4,	8,	16,	32,	64,	128,	256,	512,	1024,	2048,

12,	13,	14,	15,	16.
4086,	8192,	16384,	32768,	65536.

```
        65536
        32768
      -------
       524288
      393216
     458752
    131072
   196608
   ----------
   2147483648 Laſt term.
            2 Second term.
   ----------
   4294967296 Product of ſecond and laſt term.
            1 Square of firſt term.
   ----------
 1 ) 4294967295
   ----------
 4 ) 4294967295
   ------------
12 ) 1073741823¾
   -------------
2|0 ) 8947848|5  3¾
   ----------------
£. 4473924   5  3¾  Anſwer.
```

2. A merchant ſold 15 yards of ſatin, the firſt yard for 1s. the ſecond for 2s. the third for 4s. the fourth for 8s. &c.: I demand the price of the 15 yards. Anſw. 1638l. 7s.

3. A draper ſold 20 yards of ſuperfine cloth, the firſt yard for 3d. the ſecond for 9d. the third for 27d. &c. in triple proportion geometrical: I demand the price of the cloth. Anſwer 21792402l. 10s.

4. A goldſmith ſold 1 lb. of gold, at a farthing for the firſt ounce, 1d. for the ſecond, 4d. for the third, &c. in quadruple proportion geometrical: I demand what he ſold the whole for; alſo how much he gained by the ſale thereof, ſuppoſing he gave for it 4l. per oz.

		l.	*s.*	*d.*
Anſwer	He ſold it for	5825	8	5¼
	He gained -	5777	8	5¼

5. A crafty ſervant agreed with a farmer (ignorant in numbers) to ſerve him 12 years, and to have nothing for his ſervice but the produce of a wheat corn for the firſt year; and that product to be ſowed for the ſecond year; and ſo on from year to year, until the end of the ſaid time: I demand the worth of the whole produce, ſuppoſing the increaſe to be but in a tenfold proportion, and ſold out at 4s per buſhel. Anſwer 452112l. 4s. rejecting remainders.

Note. 1. 7680 wheat or barley corns are ſuppoſed to make a pint, and 64 pints a buſhel.

Note 2. If the firſt term in any ſeries be either greater or leſs than the ratio (except unity), then multiply any two terms together, and their product divide by the firſt term; that quotient will exactly correſpond with the ſum of their indices.

6. A threſher worked 20 days at a farmer's, and received for the firſt day's work, 4 barley corns; for the ſecond, 12 barley corns; for the third, 36 barley corns; and ſo on in triple proportion geometrical: I demand what the 20 days labour came to, ſuppoſing the whole quantity to be ſold for 2s. 6d. per buſhel. Anſwer 1773l. 7s. 6d. rejecting remainder.

7. A merchant ſold 30 yards of fine velvet, trimmed with gold very curiouſly, at 2 pins for the firſt yard, 6 pins for the ſecond, 18 pins for the third, &c. in triple proportion geometrical: I demand how much the velvet produced, when the pins were afterwards ſold at 100 for a farthing; alſo whether the ſaid mer-

chant gained or loſt by the ſale thereof, and how much, ſuppoſing the ſaid velvet to have been bought at 50l. per yard.

		l.	s.	d.
Anſwer	The velvet produced	2144699292	13	$0\frac{1}{2}$
	The merchant gained	2144697792	13	$0\frac{1}{2}$

CHAP. XXXII.

PERMUTATION.

Permutation is changing the order of things.

RULE.

Multiply all the given terms one into another continually; the laſt product is the number of changes required.

EXAMPLES.

1. I demand how many changes may be rung upon twelve bells; and alſo how long they would be in ringing but once over, ſuppoſing 24 changes might be rung in one minute, and the year to contain 365 days, 6 hours. Anſwer, the number of changes is 479001600, and the time is 37 years, 49 weeks, 2 days, 18 hours.

2. Seven gentlemen that were travelling met together by chance, at a certain inn upon the road, where they were ſo well pleaſed with their hoſt, and each other's company, that in a frolic they offered him 30l. to ſtay at that place ſo long as they (together with him) could ſit every day at dinner in a different order: the hoſt thinking that they could not ſit in many different poſitions, becauſe there were but few of them, and that himſelf would make no conſiderable alteration, he being but one, imagined that he ſhould make a good bargain; and readily (for the ſake of a good dinner and better company) entered into an agreement with them, and ſo made himſelf the eighth

perſon: I demand how long they ſtaid at the ſaid inn, and how many different poſitions they ſat in. Anſw. the number of poſitions were 40320, and the time that they ſtaid at the inn was 110 years, 142 days, 12 hours; allowing the year to conſiſt of 365 days, 6 hours.

CHAP. XXXIII.

TO EXTRACT THE SQUARE ROOT.

Sect. I.

The ſquare root of a number, is a number which being multiplied by itſelf, produceth the given number, or it may be ſaid to be a mean proportional between the given number and unity.

A table of Squares of the nine Digits.

Roots	1,	2,	3,	4,	5,	6,	7,	8,	9.
Squares	1,	4,	9,	16,	25,	36,	49,	64,	81.

1. When any number is given, out of which it is required to extract the ſquare root; firſt make a point over units place to the right hand, then over each other figure (omitting a figure between every two points); the number of theſe points ſhew how many figures are to be in the quotient or root.

2. Go to the firſt point on the left hand, and ſeek in the foregoing table the neareſt ſquare equal thereto; this root ſet in the quotient, and the ſquare ſet under the figure of the ſaid firſt point, and ſubtract.

3. Double the quotient and ſet it to the left hand of the remainder, and to the remainder bring down the figures of the next punctation; then take the double quotient for a diviſor, and the remainder ſo increaſed, omitting the firſt figure to the right hand, take as a dividend.

4. Aſk how often the diviſor is contained in the dividend, the number ſet in the quotient, and alſo to the right hand of the diviſor; then multiply the diviſor ſo

increaſed by the ſaid number, the product write under the dividend, and ſubtract.

5. To the remainder bring down the figures of the next punctation, double the whole quotient for a diviſor, and proceed as before.

Note. If the number be not exactly ſquare, you may add to the laſt remainder, as many times two cyphers as you deſign decimal parts in the root, and proceed as before.

EXAMPLE.

What is the ſquare root of 898704? Anſwer 948.

. . .
898704 (948 Anſwer.
81

184) 887
736

1888) 15104
15104

What are the ſquare roots of the following numbers, *viz.*

	Anſwers.
9604,	98,
1993744,	1412,
937024,	968,
27846729,	5277,
157509,765625	396,875
643876,	802,418+
48326954,	6951,759+
71958,	268,249+

Note. To prove theſe ſums, multiply the root by itſelf.

CHAP. XXXIV.

TO EXTRACT THE CUBE ROOT.

SECT. I.

A cube number, is when any number is multiplied into itſelf, and that product is multiplied again by the ſaid number, and the number firſt given is called the root.

A table of Cubes to the nine Digits.

Roots—1, 2, 3, 4, 5, 6, 7, 8, 9.
Cubes—1, 8, 27, 64, 125, 216, 343, 512, 729.

1. When any number is given out of which it is required to extract the cube root, firſt point units place, and every third figure from the ſame to the left hand.

2. Having thus prepared your number, find the neareſt or equal ſimple cube to the figures that remain to the left hand; whoſe root write in the quotient; and write the ſaid ſimple cube under the ſaid figures, and ſubtract. To the remainder bring down the figures of the next punctation, this number call the reſolvend, under which draw a line.

3. Square the root in the quotient, the triple of which write under the reſolvend, in ſuch a manner that the firſt place (or place of units) of the ſaid triple ſquare may ſtand directly under the third place (or place of hundreds) in the reſolvend; then triple the root, or number in the quotient, and write this number ſo that the units place may ſtand under the ſecond place of the reſolvend; theſe numbers add together, and their ſum call the diviſor.

4. See how often the diviſor is contained in the reſolvend (excluding in the reſolvend the firſt figure to the right hand), the anſwer write in the quotient, then draw a line under the diviſor, and multiply the triple ſquare before wrote down, by the laſt figure placed in the quotient, which product write under the triple ſquare, ſo that the units of one may ſtand under the units of the other; then multiply the laſt placed in the quotient, firſt by itſelf, and then that product by the triple number before wrote down; this being done, put the product under the ſaid triple, ſo that again the units place of one may ſtand under the units place of the other. Laſtly, the cube of the figure laſt placed in the quotient, write under the reſolvend units, under units.

5. Draw a line, and add the three laſt numbers together in the ſame form they ſtand, the ſum call the ſubtrahend, and ſubtract it from the reſolvend.

6. To the remainder bring down the three figures of the next punctation, and proceed as before, till you have finiſhed all the punctations.

Note. If the number be not an exact cube, you may add to the laſt remainder as many times 3 cyphers as you deſign decimal places in the root, and proceed as before.

EXAMPLE.

What is the cube root of 15625? Anſwer 25.

15625	(25
8	
7625	Reſolvend.
12	Triple ſquare of the root 2.
06	Triple number 2.
126	Diviſor.
60	Triple ſquare × by root 5.
150	The ſquare of 5 × by triple number 6.
125	The cube of 5, laſt figure.
7625	Subtrahend.
0	Remainder.

I demand the cube roots of the numbers following, *viz.*

	Anſwers.	
884736	96,	
11239424	224,	
99060039883	4627,	
20652012,657856	274,36	
43852536,484188	352,64	Surds.
83826396,788791	437,65	

THE USE OF THE CUBE ROOT.

EXAMPLES.

1. There is a cube whoſe ſolidity is 1372 feet: I demand the ſide of a cube, whoſe ſolidity is 4 times leſs. Anſwer, 7.

2. If a bullet whoſe diameter is 4 inches, weighs 9 lb. what will a bullet of the ſame metal weigh, whoſe diameter is 8 inches? Anſwer 72 lb.

3. If a bullet 2 inches diameter weighs 3 lb. what will one of the ſame metal weigh which is 8 inches diameter? Anſwer 192 lb.

4. Suppoſe a ſhot of 4 inches diameter weighs 18 lb. I demand the diameter of another that weighs 144 lb. Anſwer 8 inches. This is the reverſe of the laſt queſtion.

5. There is a ſphere, or globe, whoſe ſolid content is 250047 inches: I demand the ſide of a cube, whoſe ſolidity ſhall be equal to the ſolidity of the globe. Anſwer 63 inches.

6. A country farmer lent his neighbour out of his hayſtack, 20 feet of hay in length, breadth, and depth; and his neighbour brought him home 10 feet at one time and 10 feet at another: how is the balance, and who debtor? Anſwer, 6000 feet due to him that lent it, he having received but $\frac{1}{4}$th.

7. Suppoſe a ſhip 300 tons burthen, 75 feet by the keel, $29\frac{1}{2}$ feet by the beam, and 14 feet deep in the hold: I demand the dimenſions of another ſhip of the ſame make, of 500 tons burthen. Anſwer 88,9 feet.

CHAP. XXXV.

SINGLE FALSE POSITION.

Sect. I.

This rule is ſo called, becauſe by ſuppoſed numbers taken at adventure, and working therewith, according to the nature of the queſtion, as if it were the true number, the true number ſought is diſcovered.

1. Suppoſe the ages of three perſons make together 144 years, and that the age of the ſecond is double the age of the firſt, and the age of the third treble the

age of the ſecond: what is the age of each perſon? Anſwer 16, 32, and 96 years.

RULE.

As the reſult of your poſition is to the poſition, ſo is the given number to the true number ſought.

Suppoſe the 1ſt man's age 1
Then the 2d muſt be 2
And the 3d muſt be 6

If 9 —— 1 —— 144
1
9) 144

The age of the 1ſt man 16
The age of the 2d man 32
The age of the 3d man 96

2. Three merchants make up a ſtock of 500l. B puts in twice as much as A. and C, four times as much as B.: how much did each of them put in? Anſwer, A. $45\frac{5}{11}$l. B. $90\frac{10}{11}$l. and C. $363\frac{7}{11}$l.

3. There is a ciſtern with water, which has 3 cocks; when the greater or firſt cock is opened, all the water runs out in one hour; when the ſecond cock is opened, it runs out in two hours; and when the third cock is ſet open, it runs out in three hours: in what time will the water run out, if all the cocks were ſet open at once? Anſwer $32\frac{8}{11}$ minutes.

4. What number is it whoſe $\frac{1}{6}$ and $\frac{1}{7}$ and $\frac{1}{3}$ parts make 27? Anſwer 42.

5. Peter drinks a caſk of beer out, quantity 16 gallons, in 6 days, and John when he goes about it does it in 4 days; now, if they both ſhould drink together, in what time would they make an end of it? Anſwer, in 2 days, $9\frac{3}{5}$ hours.

6. Three perſons, A, B, C, diſcourſing concerning their age, ſays B. to A. I am as old and half as old again as you; then ſays C. to B. I am twice as old as you; now, ſays A. to them both, I am ſure the ſum of all

our ages is 154 years: I demand each man's age, Anſwer, A. 28, B. 42, and C. 84 years.

7. A gameſter loſes in 4 turns at dice 160s. and trebled each turn the ſum he put in: I would know for how much he played the firſt and laſt time. Anſwer 4s. and 108s.

8. Forty yards of drugget and 50 yards of cloth coſt 24l. 10s. but every yard of cloth coſt double as much as a yard of drugget: I demand what a yard of drugget coſt. Anſwer 3s. 6d.

9. Suppoſe I ſet at intereſt a certain ſum of money, at the rate of 8 per cent. ſimple intereſt, and that at the end of 10 years I received both for principle and intereſt 600l. I demand how much was the principal ſum I ſet out at firſt. Anſw. 333l. 6s. 8d.

II.

10. A maſter maſon, when he works alone, can finiſh a piece of work in $2\frac{1}{2}$ days, his journeyman can do it in $3\frac{3}{4}$ days, and his apprentice can do it in $4\frac{1}{2}$ days: now I would know in what time they would finiſh the ſaid work, if all three go together about it. Anſw. in 1 day and 3 hours.

Suppoſe in one day.

days *ps. w.* *day*

If $2\frac{1}{2}$ —— 1 —— 1 comes $\frac{2}{5}$

$3\frac{3}{4}$ —— 1 —— 1 comes $\frac{4}{15}$

$4\frac{1}{2}$ —— 1 —— 1 comes $\frac{2}{9}$

$\frac{8}{9}$

ps. w. *day* *ps. w.*

If $\frac{8}{9}$ —— 1 —— 1

9

8) 9

Anſw. $1\frac{1}{8}$ Day.

11. There are 5 mills, the firſt grinds 7 buſhels of corn in an hour, the ſecond 5, the third 4, the fourth 3, and the fifth 1: I demand in what time the 5 mills

will grind 500 buſhels, if they work all together. Anſwer, in 25 hours.

12. There is a ciſtern which can be filled by a cock in 12 hours, and has a hole in the bottom by which it can be emptied in 18 hours: I demand in what time the ciſtern will be full, the water running out at the hole at the bottom at the ſame time when the water runs in from the cock above. Anſwer, in 36 hours.

13. There are 3 mills, the firſt grinds in 2 hours 3 buſhels of wheat, the ſecond in 3 hours 5 buſhels, and the third in 5 hours 7 buſhels: I demand in how many hours they will together grind 36 buſhels. Anſwer, in $7\frac{121}{137}$.

CHAP. XXXVI.

DOUBLE FALSE POSITION.

Sect. I.

1. A. aſked B. how much his horſe coſt him, B. anſwered, that if his horſe coſt him 6 times as much as it did, and 4l. more, he would ſtand him in 100l.: I demand what the horſe coſt him. Anſwer 16l.

To work this rule make choice of any number, and work with it according to the nature of the queſtion, as for example: I ſuppoſe the horſe coſt 20l. which I multiply by 6 comes 120, and add 4, makes 124, which ought to be but 100; ergo, too much by 24, which I call the firſt error, and mark it thus (+) ſignifying more: again, I ſuppoſe the horſe coſt 14l. which being worked as before, comes 12 too little, which is the ſecond error, and mark it thus (—) ſignifying leſs; then add the errors more and leſs together, comes 36 for a diviſor; then multiply poſitions and their errors croſs-wiſe, and their product add; the ſum divide by 36 (the diviſor), and the quotient is the anſwer required.

Note. When the ſigns of more or leſs are alike, ſubtract; but when unlike, add.

```
Suppoſe 20      Suppoſe 14     24
        6               6      12
       ——              ——      ——
      120              84      36 diviſor
  add   4               4      ——
       ——              ——
      124              88
      100             100
       ——              ——
      24 +            12 —
              ×
       20              14
      ——————————————————
      240             336
  16                  240
   6                  ——
  ——          36 ) 576 ( 16
  96                   36
   4                   ——
  ——                  216
 100 Proof.           216
  ——                  ——
```

2. One being aſked how old he was, anſwered; if my age was doubled, the half and the quarter of my age added to it, more 1 year, I ſhould be 100 years old: what is his age? Anſwer 36 years.
3. Being aſked how long I had kept ſchool, I anſwered, if you treble the years, and add to it the half, and the quarter of the years, more ¾, it will be 34½ years: I demand the time. Anſwer 9 years.
4. If the number of my ſcholars was doubled, the ½ and the ¼ of the number added to it, more 30, they would be 250: how many are they? Anſwer 80.
5. One aſked how many pence I had in my pocket; I told him that my pence with ½, and ¼, with ⅛ together, leſs 2, would make 43d.: well then, ſays he, you have 24d. Anſwer, right.
6. If I made my money 8 times more than it is, and gave 6 times 6 of it to the poor, and divided the reſt of it by 4, then I find that every part is 21 crowns: tell me how many crowns I had. Anſwer 15 crowns.

7. A. aſked B. to lend him the 100 crowns he had in his pocket, B. anſwered, he had not ſo many; but, ſays he, if I had half as many more as I have, with $\frac{1}{4}$, and $\frac{1}{8}$, and ^{1} of the number of crowns which I have, leſs 3, there would be 46: well then, ſays A. I find you have only 24 crowns. Anſw. juſt as many.

8. A man on horſeback ſets out of a certain town, and a coach ſets out of another town; at a certain diſtance they meet; the coachman aſks the man on horſeback how many miles he had rid; he anſwered, that if he had rid 1$\frac{1}{2}$ times as far again as he had done, he ſhould have rid 36 miles; well then, ſays the coachman, I have rid $\frac{1}{2}$ as far and $\frac{1}{4}$ as far as you: now tell me how many miles the towns are aſunder. Anſwer 25$\frac{1}{5}$ miles.

II.

9. Divide 15 into two ſuch parts, ſo that when the greater is multiplied by 4, and the leſſer by 16, their product muſt be equal. Anſwer 12 and 3.

```
     Suppoſe          Suppoſe
     9 and 6          10 and 5        60
     4    16           4    16        40
     —    —            —    —         —
    36    96          40    80        20
          36                40        —
          —                 —
          60+                40+

     9    6           10    5
    ————————         ————————
   360   240          600   300
                      360   240
                     ————————
                 20) 240    60
                     ————————
                      12     3
                       4    16
                     ————————
               Proof  48    48
                     ————————
```

10. A maſter hires a journeyman on this condition, that he ſhall have 12d. a day, and his diet, for every day he works, but for every day he does not work, he is to pay his maſter 6d. for his diet; now the 30th day they come to an account, but neither of them receives or pays any money: I demand how many days he worked, and how many days he was idle. Anſwer, he worked 10 days, and was idle 20.

11. What numbers are they, that when you add them make $266\frac{2}{3}$, and when you multiply the one by 5, and the other by 3, their product ſhall be equal? Anſwer $166\frac{2}{3}$ and 100.

12. There are two numbers which, when they are added together, make 102, and the one being multiplied by 15 is the ſame as the other being multiplied by 21: what are thoſe numbers? Anſwer $59\frac{1}{2}$ and $42\frac{1}{2}$.

13. Divide 21 into two ſuch parts, ſo that when the greater is divided by the leſſer, and the leſſer by the greater, and afterwards the greater quotient multiplied by 5, and the leſſer by 125, their products ſhall be equal. Anſwer, $17\frac{1}{2}$d. and $3\frac{1}{2}$.

III.

14. A maſter hires a ſervant for 40 days, when he works he is to have 15d. a day, and when he is idle he is to pay his maſter 4d. a day; at the end of 40 days they come to an account, and the ſervant receives 23s. 1d.: tell me how many days he wrought, and how many days he was idle. Anſw. he wrought 23 days, and was 17 days idle.

			Suppoſe					Suppoſe				
					d.					d.		
		Worked	25	at	15	375		24	at	15	360	
		Idle	15	at	4	60		16	at	4	64	
			—			—		—			—	
			40			315		40			296	
			ſhould be			277					277	
s.	d.					—					—	
23	1					+38					19+	
12							×					38+
—												19+
277						25					24	—
—						—					—	19
						475					912	

```
       475              912
                        475
                        ——— days
                   19 ) 437 ( 23 worked.
                        38
                        ——
                         57
                         57
                         ——
       +38                19+
                  ×
        15                16
       ———               ———
       285               608
                         285
                         ——— days
 Proof.            19 ) 323 ( 17 idle.
         d     s.  d.    19
 23 at  15 is  28  9     ———
 17 at   4 is   5  8     133
 ——            ————      133
 40            23  1     ———
 ——            ————
```

15. A merchant hath 100 barrels of wheat, and barley, which coſt him 46l. 10s. the wheat ſtands him in 12s. and the barley in 6s. the barrel: tell me how many barrels he has of each. Anſwer, 55 of wheat, and 45 of barley.

16. There are two numbers, when you add them they make 100, and when you multiply the greater by 3, and the leſſer by $4\frac{7}{8}$, their difference is $4\frac{11}{18}$: what are thoſe numbers? Anſw. $62\frac{1}{2}$ and $37\frac{1}{2}$.

17. A goldſmith has 2 maſſes of ſilver, weight together 24 lb. the heavieſt at 5s. and the lighteſt at 5s. 4d. the oz. amounting together to 74l. 4s.: tell me how much each maſs weighed. Anſw. 13 lb. and 11 lb.

18. There are two numbers which when added make 35; if you divide the leſſer by 4, and the greater by 3, their quotients being added will make 11: I demand the numbers. Anſwer 27 and 8.

19. A. departs from London at the ſame time when B. departs from Bath; A is bound for Bath, and B. for London, each keeping the ſame road, and the diſtance between London and Bath I ſuppoſe to be only 100 miles; when they meet, the miles A. has travelled being multiplied by $3\frac{3}{4}$, and the miles B. has travelled by $5\frac{1}{4}$, the difference of their product will be $75\frac{3}{4}$: I demand how much farther the one went than the other. Anſwer A. went further by $33\frac{1}{2}$ miles.

IV.

20. A. and B. go out of a town, keeping both the ſame road, but A. goes every day 8 miles, and B. goes the firſt day 1 mile, the ſecond day 2 miles, and ſo on every day 1 mile more: I demand when B. will overtake A. Anſwer, in 15 days.

Suppoſe A.	5	B. 1	Suppoſe A.	7	B. 1	
	8	2		8	2	
	—	3		—	3	
	40	4		56	4	
	15	5		28	5	
	—	—		—	6	
5)	25	15	7)	28	7	
	—	—		—	—	
	+5			4+	28	
			×		—	
						5+
	5			7		4+
	——			——		—
	20			35		1
				20		
				—		
			1)	15		
				—		

Anſwer 15 days

21. There are two maſter maſons, who are each to build a wall of equal dimenſions. A. employs ſo many men as finiſh every day $22\frac{1}{2}$ perches, B. employs the firſt day as many men as finiſh 6 perches, the ſecond day as many as finiſh 9 perches; and ſo on every day 3

perches more: in what time will they have built an equal number of perches? Anſwer, in 12 days.

22. A gentleman hires 2 labourers, the one he gives conſtantly 9d. a day, the other he gives the firſt day 2d. the ſecond day 4d. the third day 6d. and ſo on every day 2d. more: I demand in how many days they will have earned equal money. Anſ. in 8 days.

23. A. and B. buy an equal quantity of cloth, and lay out an equal quantity of money; A. gives 7s. for every yard he buys, and B. gives 2s. for the firſt yard, and 4s. for the ſecond yard, and ſo on 2s. more for each yard: I would know how many yards they bought, and how much money they laid out. Anſw. 6 yards, and laid out 42s. each.

V.

24. What numbers are they, that when added make 25, and when you halve the one and double the other, their ſum ſhall be equal? Anſw. 20 and 5.

Suppoſe		Suppoſe		
14 and	11	18 and	7	15+
double	11	double	7	5+
	—		—	—
½ is 7	22	½ is 9	14	10
	7		9	—
	—		—	
	+15		5+	

×

14	18
70	270
	70
1|0)	20|0
	20

+15	5+
×	
11	7
55	105
	55
	1|0) 5|0
	5

25. One received 2 heaps of crowns, making both together 36; the $\frac{1}{2}$ and $\frac{1}{4}$ of the firſt heap were equal to the $\frac{1}{4}$ and $\frac{1}{8}$ of the ſecond heap: I demand how many crowns there were in each heap. Anſw. 12 and 24.

26. There are two numbers, which when you add together make 30; the $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{8}$ of the greater is equal to $\frac{1}{2}$, $\frac{3}{4}$, and $\frac{1}{4}$ of the leſſer number: tell me what are the numbers. Anſwer, 12 and 18.

VI.

27. A. and B. diſcourſing of their money, ſays A. to B. if you give me 3s. of your money I ſhall have 5 times as many as you have left: no, ſays B. it were better that you give me 5s. of yours, for then our money will be equal: how many ſhillings had each? Anſwer, A. 17, and B. 7.

Suppoſe		Suppoſe		
A. 22	B. 8	A. 12	B. 6	
3	3	3	3	
25	5	15	3	
22	8	12	6	
5	5	5	5	
17	13	7	11	4+
13		11		4−
+4		4		8

+ 4				4 −
22	8		12	6
88	32		48	24
			88	32
		8)	136	56
			17	7

28. Says **A.** to **B.** give me one of your ſhillings, and I ſhall have double the ſhillings that you have left; **B.** anſwered, 'tis more reaſonable that our ſums ſhould be equal, and therefore, if you give me 1s. I ſhall have as many as you: I demand how many ſhillings each had. Anſwer, A. 7, and B. 5.

29. If from a piece of cloth I cut $\frac{2}{3}$ + 11 yards, there is left $\frac{1}{2}$ — 17 yards: I demand how many yards were in the whole piece. Anſwer, 36 yards.

VII.

30. What number is it whoſe $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{3}{8}$ being multiplied together make 24? Anſwer 8.

Suppoſe			Suppoſe			
12		12		4	4	
12					4	
	$\frac{1}{2}$ is	6	$\frac{1}{2}$ is	2		
144	$\frac{1}{4}$ is	3	$\frac{1}{4}$ is	1	16	
12					4	
		18		2		
1728	$\frac{3}{8}$ is	4$\frac{1}{2}$	$\frac{3}{8}$ is	1$\frac{1}{2}$	64	
						21 −
		81		3		57 +
Ought to be		24		24		
						78
		+ 57		21 −		

×

1728	64
36288	3648

```
     36288          3648
      3648
     ------    3
78 ) 39936 ( √ 512 = 8.
     390
     ---
      93
      78
     ---
     156
     156
     ---
```

31. A aſked B. how old he was, B. anſwered, if $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{3}{8}$ of my years are multiplied, their product will be 192: tell me B.'s age. Anſwer 16 years.

32. What number is it whoſe $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{5}$, and $\frac{1}{6}$ being multiplied together, produce $6998\frac{2}{5}$? Anſw. 36.

CHAP. XXXVII.

DUODECIMALS,

Or what is generally called

CROSS MULTIPLICATION.

Rule.

1. Under the multiplicand write the correſponding denominations of the multiplier.

2. Multiply each term in the multiplicand (beginning at the loweſt) by the feet in the multiplier, write each reſult under its reſpective term, obſerving to carry (1), or an unit for every 12, from each lower denomination to its next ſuperior.

3. In the ſame multiply the multiplicand by the primes in the multiplier, and write the reſult of each term one place, one more to the right hand of thoſe in the multiplicand.

4. Work in the ſame manner with the ſeconds in the multiplier, ſetting the reſult of each term two places to the right hand of thoſe in the multiplicand, and ſo on for the remaining denominations.

EXAMPLES.

	Croſs Multiplication.	Duodecimals.
	f. *in.*	*f.* *in.*
1. Multiply	7 . 9	7 . 9
by	3 . 6	3 . 6
	21 .	23 . 3
	2 . 3	3 . 10 . 6
	3 . 6	27 . 1 . 6
	. 4 . 6	
	27 . 1 . 6	

		f.	*in.*	″		*f.*	*in.*	″	*ft.*	*in.*	″	‴	IV
									Anſwers.				
2	Mult.	8.	5.		by	4.	7.		38.	6.	11.		
3	——	9.	8.		—	7.	6.		72.	6.			
4	——	8.	1.		—	3.	5.		27.	7.	5.		
5	——	7.	6.		—	5.	9.		43.	1.	6.		
6	——	4.	7.		—	3.	10.		17.	6.	10.		
7	——	7.	5.	9.	—	3.	5.	3.	25.	8.	6.	2.	3.
8	——	10.	4.	5.	—	7.	8.	6.	79.	11.	0.	6.	6.
9	——	75.	7.		—	9.	8.		730.	7.	8.		
10	——	97.	8.		—	8.	9.		854.	7.			
11	——	57.	9.		—	9.	5.		543.	9.	9.		
12	——	75.	9.		—	17.	7.		1331.	11.	3.		
13	——	87.	5.		—	35.	8.		3117.	10.	4.		
14	——	179.	3.		—	38.	10.		6960.	10.	6.		
15	——	259.	2.		—	48.	11.		12677.	6.	10.		
16	——	257.	9.		—	39.	11.		10288.	6.	3.		
17	——	311.	4.	7.	—	36.	7.	5.	11402.	2.	4.	11.	11.
18	——	321.	7.	3.	—	9.	3.	6.	2988.	2.	10.	4.	6.

THE USE, OR APPLICATION.

Artificers work is computed by different meaſures, *viz.*

1. Glazing and maſon's flatwork by the foot.

2. Painting, plaſtering, paving, &c. by the yard.

3. Partitioning, flooring, roofing, tiling, &c. by the ſquare of 100 feet.

4. Brickwork, &c. by the rod, or 16½ feet, the ſquare of which is 272¼ feet.

Meaſuring by the foot ſquare, as glaziers and maſon's flat-work.

1. There is a houſe with 3 tier of windows, 3 in a tier; the height of the firſt tier 7 feet 10 inches, the ſecond 6 feet 8 inches, and the third 5 feet 4 inches; the breadth of each is 3 feet 11 inches; let me know what the glazing will come to at 14d. the foot. Anſwer, 13l. 11s. 10½d.

f. *in.*
7 . 10 the
6 . 8 heights
5 . 4 added.

19 . 10
3 = windows

59 . 6 in a tier.
3 . 11 in breadth.

178 . 6
54 . 6 . 6

233 .. — .. 6

f. *in.* *pts.*
233 .. — .. 6
at 1 .. 2 per foot.

s.
d. 223 . — — = 1
2 ⅙ 38 . 10 — = 2*d.*
½ = 6 pts.

2|0) 27|1 .. 10½

£. 13 .. 11 .. 10½

2. What is the worth of 8 ſquares of glaſs, each meaſuring 4 feet 10 inches long, and 2 feet 11 inches broad, at 4⅛.d per foot? Anſwer 1l. 18s. 9d.

3. There are 8 windows to be glazed, each meaſures 1 foot 6 inches wide, and 3 feet in height: how much will they come to at 7¾d. the foot? Anſwer 1l. 3s. 3d.

4. What is the price of a marble ſlab, whoſe length is 5 feet 7 inches, and the breadth 1 foot 10 inches, at 6s. per foot? Anſwer 3l. 1s. 5d.

Meaſuring

Meaſuring by the yard ſquare, as pavers, painters, plaſterers and joiners.

Note. Nine ſquare feet make a ſquare yard.

EXAMPLES.

5. A room is to be ceiled whoſe length is 74 feet 9 inches, and width 11 feet 6 inches: what will it come to, at 3s. 10½d. per yard? Anſw. 18l. 10s. 1d.
6. What will the paving of a court-yard come to at 4¾d. per yard, the length being 58 feet 6 inches, and breadth 54 feet 9 inches? Anſwer 7l. 0s. 10d.
7. A room painted 97 feet 9 inches about, and 9 feet 10 inches high: what does it come to at 2s. 8¼d. the yard? Anſwer 14l. 11s. 4½d.
8. What is the content of a piece of wainſcotting in yards ſquare, that is 8 feet 3 inches long, and 6 feet 6 inches broad, and what will it come to at 6s. 7½d. per yard? Anſwer 1l. 19s. 5d.
9. What will the paving of a court-yard come to, at 3s. 2d. the yard, if the length be 27 feet 10 inches, and the breadth 14 feet 9 inches? Anſw. 7l. 4s. 5d.
10. A perſon has paved a court-yard, 42 feet 9 inches in front, and 68 feet 6 inches in depth, and in this he laid a foot-way the depth of the court, of 5 feet 6 inches in breadth; the foot-way is laid with purbeck ſtone, at 3s. 6d. the yard, and the reſt with pebbles at 3s. the yard: I demand what the whole comes to. Anſwer 49l. 17s.
11. What will the plaſtering of a ceiling at 10d. per yard come to, ſuppoſing the length 21 feet 8 inches, and the breadth 14 feet 10 inches? Anſ. 1l. 9s. 9d.
12. What will the wainſcotting a room come to, at 6s. per ſquare yard, ſuppoſing the height of the room (taking in the cornice and moulding) is 12 feet 6 inches, and the compaſs 83 feet 8 inches; the 3 window ſhutters, each 7 feet 8 inches, by 3 feet 6 inches; and the door 7 feet by 3 feet 6 inches; the ſhutters and door being worked on both ſides, is reckoned work and half work? Anſw. 36l. 12s. 2½d.

Meaſuring by the ſquare of 100 feet, as flooring, partitioning, roofing, tiling, &c.

EXAMPLES.

13. In 173 feet 10 inches in length, and 10 feet 7 inches in height of partitioning, how many ſquares? Anſwer, 18 ſquares, 39 feet, 8 inches, 10 parts.

14. A houſe of 3 ſtories beſide the ground floor, is to be floored at 6l. 10s. per ſquare, and the houſe meaſures 20 feet 8 inches, by 16 feet 9 inches; there are 7 fire places, whoſe meaſures are, two of 6 feet, by 4 feet 6 inches each; two of 6 feet, by 5 feet 4 inches each; and two of 5 feet 8 inches, by 4 feet 8 inches; and the ſeventh of 5 feet 2 inches, by 4 feet; and the well-hole for the ſtairs is 10 feet 6 inches, by 8 feet 9 inches: what will the whole come to? Anſwer 53l. 13s. 3¼d.

15. If a houſe meaſures within the walls 52 feet 8 inches in length, and 30 feet 6 inches in breadth, and the roof be of a true pitch; what will the roofing come to, at 10s. 6d. per ſquare? Anſwer 12l. 12s. 11¾d.

Note. In tiling, roofing, and ſlating, it is cuſtomary to reckon the flat and half of any building within the wall, to be the meaſure of the roof of that building, when the ſaid roof is of a true pitch, that is, when the rafters are ¾ of the breadth of the building; but if the roof is more or leſs than the true pitch, they meaſure from one ſide to the other, with a rod or ſtring.

16. What will the tiling of a barn coſt, at 25s. 6d. per ſquare, the length being 43 feet 10 inches, and breadth, 27 feet 5 inches on the flat; the eaves-boards projecting 16 inches on each ſide? Anſwer 24l. 9s. 5d.

Meaſuring by the rod.

Note. Bricklayers always value their work at the rate of a brick and a half thick; and if the thickneſs of the wall is more or leſs, it muſt be reduced to that thickneſs by the following rule.

RULE.

RULE.

Multiply the area of the wall by the number of half bricks the wall is of; the product divided by 3, gives the area.

EXAMPLES.

17. How many ſquare rods are there in a wall 62$\frac{1}{2}$ feet long, 14 feet 8 inches high, and 2$\frac{1}{2}$ bricks thick? Anſwer 5 rods, 166 feet.

18. If the area of a wall be 4085 feet, and the thickneſs two bricks and a half; how many rods doth it contain? Anſwer 25 rods.

19. If a garden wall be 254 feet round, and 12 feet 7 inches high, and 3 bricks thick, how many rods doth it contain? Anſw. 23 rods, 136 feet.

CHAP. XXXVIII.

QUESTIONS TO EXERCISE MOST OF THE RULES HITHERTO DELIVERED, PROMISCUOUSLY PUT DOWN.

1. There is a maſt or pole, $\frac{1}{9}$ of its length ſtands in the ground, 12 feet of it in the water, and $\frac{5}{6}$ of its length in the air, or above water: I demand the whole length. Anſwer 216 feet.

2. If from a piece of cloth I cut $\frac{5}{16}$ — 12 yards, then there is left $\frac{3}{8}$ + 20 yards; I demand how many yards there were in the piece. Anſw. 128 yards.

3. Three merchants, A. B. C. have gained in partnerſhip 234l. which they are to divide in this manner: when the profit of A. is multiplied by 2, and that of B. by 3, and C.'s by 4, their products are to be equal: I demand how much each of them is to receive. Anſwer A. 108l. B. 72l. and C. 54l.

4. When 198 lb. of London is carried 8 miles for 25s. 7$\frac{1}{5}$d. how much muſt one give to carry 480 lb. of Amſterdam 15 miles, if 110 lb. at London is equal to 100 at Amſterdam? Anſwer 6l. 8s.

5. There is a wall of 2000 feet long, and 2$\frac{1}{2}$ feet thick, the ſtones are $\frac{1}{2}$ foot long, $\frac{1}{4}$ foot broad, and $\frac{1}{8}$ foot

thick, including the mortar; and in the whole wall are 4000000 ſtones: I demand the height of the wall. Anſwer $12\frac{1}{2}$ feet.

6. What numbers are they whoſe $\frac{1}{2}$, $\frac{1}{8}$, and $\frac{1}{12}$ of the one is equal to $\frac{1}{5}$, $\frac{1}{6}$, and $\frac{1}{9}$ of the other? Anſwer, 264 and 306.

7. There are two pieces of linen, the one is 9 yards ſhorter than the other, and coſt 3l. $1\frac{1}{5}$s. the other piece at the ſame price coſt 3l. 12s.: I demand how many yards there are in both pieces, and the price of 1 yard. Anſwer 111 yards, at $1\frac{1}{5}$s. the yard.

8. If with 100 barrels of beer I mix $66\frac{2}{3}$ barrels of water, it is 3s. beer: I demand what beer it was before. Anſwer 5s. beer.

9. Tell me a number whoſe $\frac{1}{2}$ being divided by 6, its $\frac{1}{3}$ by 4, and its $\frac{1}{4}$ by 3, each quotient ſhall be 9. Anſwer 108.

10. A piece of ſatin coſt a certain ſum, and being ſold for 3l. 10s. there is loſt $\frac{2}{5}$ in a ſhilling: I demand the firſt coſt. Anſwer 5l. 16s. 8d.

11. A. has brandy which coſt 4s. the gallon; in barter puts it at 4s. 6d. and gives 6 months time; B. has wine which ſtands him in 10l. 5s. the hhd. and puts it at 11l.: I demand how much time B. muſt give to make the barter equal. Anſwer $3\frac{21}{41}$ months.

12. A. ſets out from London to Rocheſter, at the ſame time B. ſets out from Rocheſter towards London, the diſtance between both places ſuppoſe 30 miles, and both perſons keep the ſame road; A. goes every day 2 miles more than B. and the ſecond day they meet: I demand how many miles a day each had travelled. Anſwer, A. $8\frac{1}{2}$, and B. $6\frac{1}{2}$.

13. When a buſhel of wheat coſts 3s. 4d. the 1d. loaf weighs 12 ounces: what ſhall a loaf worth 9d. weigh, when the wheat is at 10s. 8d.? Anſwer $33\frac{3}{4}$ ounces.

14. If 12 boarders drink in 7 days half a barrel of beer, how long would the ſame laſt if 2 boarders more came among them? Anſwer 6 days.

15. If a hhd. of wine be ſold for 10l. there is loſt 6 per cent. how much is the gain or loſs per cent. when

5 hhds. are ſold for 45l. 10s.? Anſwer $14\frac{23}{30}$ per cent. loſs.

16. Eight perſons, conſiſting of men and women, have ſpent together 5s. 4d. each man 10d, and each woman 6d.: I demand how many men and women there were. Anſwer 4 men and 4 women.

17. What is the product of 19l. 19s. $11\frac{3}{4}$d. being multiplied by 19l. 19s. $11\frac{3}{4}$d.? Anſ. 399l. 19s. $2\frac{1}{3840}$d.

18. I have a bond, $\frac{1}{3}$ whereof is preſent payment, $\frac{1}{4}$ in 4, $\frac{1}{5}$ in 5, and the remainder in 6 months: in what time might I receive the ſame without any prejudice to myſelf? Anſwer, in 3 months, 9 days.

19. How many yards of baize of $1\frac{1}{16}$ yard wide, will be wanted to hang a room of $16\frac{1}{2}$ feet long, $12\frac{3}{4}$ feet broad, and $10\frac{1}{4}$ feet high? Anſwer $62\frac{12}{17}$ yards.

20. A fiſherman being aſked how much fiſh he had caught, anſwered, that the $\frac{3}{8}$ of his fiſh were herrings, $\frac{1}{6}$ whitings, $\frac{2}{5}$ haddocks, and 21 cods: now tell me how many he had in all, and how many he had of each ſort. Anſwer 135 herrings, 144 haddocks, 60 whitings, and 21 cods, in all 360.

21. A gentleman has at work 3 maſter maſons, who have each 8 journeymen, and earn in 5 weeks (each week counted at 6 days) 43l. 4s. Now the ſaid gentleman employs in another work 5 maſter maſons, who have each 10 journeymen, who earn every week (each week at $5\frac{1}{2}$ days) as much as the former: I demand how much they would earn in 8 weeks? Anſwer 132l.

22. Two merchants enter into partnerſhip, and each of them puts in 12 pieces of cloth; but thoſe of A. coſt 48l. more than thoſe of B: the cloth being ſold, they find they have gained 273l. of which B. has for his ſhare $122\frac{2}{5}$l.: I deſire to know at how much each piece was valued. Anſwer, A.'s 21l. and B.'s 17l.

23. I once counted my pence, and found that when I multiplied the $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{1}{5}$ of the number, the product was 72000d.: tell me how many ſhillings I had. Anſwer 10s.

24. If 7 perſons drink 36 gallons of beer in 12 days,

how many gallons will be drank out at that rate in 8 days by 14 perſons? Anſwer 48 gallons.

25. One being aſked the hour of the day, anſwered, that the time paſt from noon was equal to $\frac{2}{13}$ of the time remaining from midnight: I demand what o'clock it was. Anſwer 36 minutes paſt 1.

26. Three merchants are in company, their ſtock is 400l. the money of A. continued in 5 months, that of B. 6 months, and C.'s 9 months, and they gain 375l. which they divide equally: I demand the ſtock each of them put in. Anſwer A. $167\frac{19}{43}$l. B. $139\frac{23}{43}$l. and C. $93\frac{1}{43}$l.

27. There is a certain number, which if you divide by 7, its quotient multiplied by 3, that product divided by 5, from the quotient ſubtract 20, to the reſt add 30, and half the laſt ſum ſhall make 35: I demand the number. Anſwer 700.

28. A. aſked B. his age, B. anſwered thus, if you ſquare my age, and divide the product by 2, the quotient you will find to be $55\frac{1}{8}$; well, ſays A. you are exactly $10\frac{1}{2}$ years.

29. If 16 men in 20 days build a wall of 25 feet long, 6 feet high, and 2 feet thick; in how many days will 80 men build a wall of 400 feet long, 10 feet high, and 3 feet thick? Anſwer, in 160 days.

30. A ſhip is manned with 300 men, who are provided with bread for 12 months, ſo that each man has 20 ounces per day; but having been 6 months on their voyage, they find it will require 9 months more before they finiſh the ſaid voyage, and alſo that they have loſt 50 of their men: now tell me how many ounces of bread each man may have during the ſaid 9 months, each month 30 days? Anſwer, 16 ounces.

31. A merchant ſold tobacco at 15d. the lb. and loſt at the rate of 10 per cent.; he ſold 100l. worth more of the ſame parcel, and gained 40 per cent.: tell me how many lb. there were in the laſt parcel, and at what rate he ſold it the lb. Anſwer, $1028\frac{4}{7}$ lb. at $23\frac{1}{3}$d.

32. Four perſons hire a coach to go 100 miles, for 9l. 10s. with condition that if they take any body in upon the road, the profit ſhall belong unto them: now when they have travelled 40 miles, they take in the coach 2 perſons, with condition that they ſhall pay proportionable with the other 4 perſons: I demand how much each of them ought to pay. Anſwer, the 4 perſons 7l. 6s. $1\frac{1}{13}$d. and the 2 perſons 2l. 3s. $10\frac{2}{13}$d.

33. A vintner has a caſk of wine of 500 gallons, of which he draws 50 gallons, and then fills it up with water, and does ſo 5 times: I demand how much wine and how much water there is left in the caſk. Anſwer $295\frac{49}{200}$ gallons of wine, and $204\frac{151}{200}$ gallons of water.

34. If a mother and 2 daughters together can ſpin 3 lb. of flax in 1 day, and that the mother can do it in $2\frac{1}{2}$ days, and the eldeſt daughter in $2\frac{1}{4}$ days, in what time could the youngeſt daughter do it alone? Anſwer in $6\frac{3}{7}$ days.

35. A merchant loads 2 veſſels, in A. 150 hhds. and in B. 240 hhds. of wine; the ſhips coming by a certain paſs, A. pays for toll 1 hhd. and receives 12s. back; B. pays alſo 1 hhd. and 36s. more: I demand at how much each hhd. was valued. Anſw. 4l. 12s.

36. A gentleman beſtows 1000l. in legacies, in this manner; to A. a certain ſum, to B. $\frac{1}{4}$ more than to A. to C. $\frac{1}{4}$ leſs than to A. and to D. twice as much as to C.: I demand how much each of them muſt have. Anſwer, A. $222\frac{2}{9}$l. B. $277\frac{7}{9}$l. C. $166\frac{6}{9}$l. and D. $333\frac{3}{9}$l.

37. When I ſell a yard of cloth for 15d. I gain 10s. by the piece, and when I ſell the yard for 14d. I gain 6s. by the ſame piece: I demand how many yards were in the piece. Anſwer 48 yards.

38. Four merchants have a certain ſum of money to divide between them in this manner: when A. has $\frac{1}{4}$ of the whole ſum, then B. gets $\frac{1}{5}$; and when C. gets $\frac{1}{2}$, then D. muſt have $\frac{3}{8}$: now if D. gets 150l. for his ſhare, I demand how much the others muſt have. Anſwer, A. 100l. B. 80l. C. 200l.

39. Bought 40 yards of cloth of $2\frac{1}{4}$ yards broad, but being made wet it ſhrunk upon every 4 yards half a quarter, and in breadth upon $1\frac{1}{2}$ yard, 1 nail and a half: to line this cloth I bought baize of 5 quarters broad, which being made wet, ſhrunk upon 20 yards in length, the whole breadth, and in breadth it ſhrunk half a nail: I demand how many yards of baize would line the ſaid cloth. Anſwer $71\frac{7}{15}$ yards.

40. In what time could I, with 514l. gain 66l. 16s. $4\frac{4}{5}$d. at the rate of 8 per cent. per annum? Anſwer in $19\frac{1}{2}$ months.

41. If 4 lb. of A. are as heavy as 3 lb. of B. and 5 lb. of B. as much as 4 lb. of C. and 6 lb. of C. as much as 5 lb. of D.: how many lb. of D. are then as heavy as 240 lb. of A.? Anſwer 120 lb. of D.

42. There is a certain number of horſe and foot to be ferried over a river, and they agree to pay for 2 horſes $2\frac{1}{2}$d. and for 7 foot $3\frac{1}{2}$d: now when they were all over, the ferryman received 25l. (7 foot always followed 2 horſe): I demand how many horſe and foot there were. Anſwer 2000 horſe and 7000 foot.

43 Three merchants put in together 100l. B. puts in 3 times as much as A. more 4l. and C. puts in as much as A. and B. together, more 6l.: I demand how much each of them put in. Anſ. A. $10\frac{3}{4}$l. B. $36\frac{1}{4}$l. and C. 53l.

44. How many pears can I have for 11s. 3d. if 70 almonds are worth 50 cheſtnuts, and 48 cheſtnuts 1 pomegranate, and 28 lemons 18 pomegranates, and 25 pears 10 lemons, and 108 almonds coſt $2\frac{1}{4}$d.? Anſwer 375 pears.

45. Three fiſhermen have each of them caught a certain number of fiſh; when the firſt and ſecond men's fiſh are put together, they make 110; when the ſecond and third are put together, they make 130; and when the firſt and third are put by one another, then there are 120. Now the fiſh are to be divided equal amongſt them: I demand each man's ſhare,

and how many each of them had caught? Anſw. 50, 60, 70, and each man's ſhare, 60.

46. If 6 gallons of brandy and 4 cobs (each 4s. 9d.) ſtand in proportion againſt 15 gallons, leſs 5 cobs; what is the price of 1 gallon? Anſwer 1 cob.

47. Suppoſe the ſide walls of a houſe be 28 feet 10 inches in length, and the height of the roof from the ground 53 feet 8 inches, and the gable (or triangular part at top) to riſe 42 courſe of bricks (reckoning 4 courſe to a foot); now 20 feet high is $2\frac{1}{2}$ bricks thick, 20 feet more at 2 bricks thick, 13 feet 8 inches more at $1\frac{1}{2}$ brick thick, and the gable at 1 brick thick: I demand what will the whole work come to, at 5l. 16s. per rod. Anſwer 48l. 13s. $5\frac{1}{2}$d.

48. There are 12 troopers, 25 ſoldiers, and 18 ſeamen, who have got a booty of 897l.; now according to agreement one trooper muſt have as much as two ſoldiers, and 3 ſoldiers as much as 5 ſeamen: I demand each man's ſhare. Anſwer, a trooper 30l. a ſoldier 15l. and a ſeaman 9l.

49. There is a golden cup, valued at 70 crowns, and two heaps of crowns; now when you put the cup by one of the heaps, they are together 4 times the value of the ſecond heap; when you put the cup by the ſecond heap, they are together double the value of the firſt heap: I demand how many crowns there were in each heap. Anſwer 50 and 30.

50. Three merchants made a company, A. put in 150l. for 14 months, B. put in a certain ſum for a year, and C. put in 100l. for a certain time; ſome time afterward they found that their ſtock and profit together made 475l. of which A. took 195l. B. 153l. and C. 127l.: I demand how much B. put in, and how long time C.'s ſtock was in? Anſwer, B. put in $121\frac{31}{44}$l. and C.'s ſtock was in company $12\frac{3}{5}$ months.

51. A fountain has 4 cocks, A, B, C, D, and under the fountain ſtands a ciſtern which can be filled by the cock A in 6 hours, by B in 8, by C in 10,

and by D in 12 hours; now the ciſtern has 4 holes, as E, F, G, H, and can be emptied by the hole E in 6 hours, by F in 5, by G in 4, and by H in 3 hours: ſuppoſe the ciſtern to be full of water, and that all the cocks and holes were let run together, I demand in what time the ciſtern would be empty. Anſwer, in $2\frac{2}{19}$ hours.

ERRATA.

In the Uſe of Diviſion, No. 32, *for* 518400 grains, *read* 5184000 grains; No. 48, Reduction, *for* Anſ. 1104327l. 9s. *read* 1104448l. 19s.; and in the ſecond bill, *viz.* a mercer's bill, *for* 35l. 16s. 5d. *read* 32l. 16s. 5d.

MVSEVM
BRITANNICVM